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Part I.—HISTORY, LITERATURE, &c.

No. I.—1873.

A Copper Plate containing a grant of land by Lakshman Sen of Bengal, found near Torpon-dighi in the District of Dinájpúr, 1874—
By E. VESEY WESTMACOTT, C. S.

(With two plates.)

Among the works undertaken to employ the people in Dinájpúr during the scarcity of 1873-4 was the deepening of a small tank to the north of the one called Torpon-dighi, or 'the tank of offerings,' six or seven miles S. S. E. of the ancient Muhammañan capital of Debkoṭ, and the Hindú remains called the city of Ban Rájá. Two miles to the eastward is a mauza, called Bāneshwarbáti, and Doctor Buchanan, in his account of Dinájpúr, mentions the traditions connecting this neighbourhood with the mythical Ban Rájá.

From the mud at the bottom of this small tank was dug a copper plate, thirteen inches long by eleven and a half wide, engraved on both sides with a grant of land made to a Bráhmañ by Lakshman Sen, a prince of the Hindú dynasty which Muhammañad Bakhtyár Khilji found on the throne of Bengal, when he carried the Muhammañan arms into that province, A. D. 1203.

At the top of the plate is affixed a circular relief, nearly three inches across, in copper, representing a ten-armed god, very similar to that lithographed by Mr. James Prinsep as at the head of a plate containing a record of a grant made by Keshab Sen, son of Lakshman Sen, found in paraganah Edilpúr, zila' Báqirganj.†

The character approaches more nearly to that of the Keshab Sen plate, so far as I can judge of the latter from Mr. Prinsep's lithograph of a somewhat imperfect impression, than to that of any other plate which I have

* Page 660, Vol. II, Martin's Eastern India.

† Page 40, Vol. vii, Journal, As. Soc. Bengal.

had an opportunity of examining, but differences are perceptible, the later plate tending more to the modern Bengali. Both are of a type rather Bengali than Devanāgarī, and of a type which has advanced nearer to the Bengali than the Aṃgāchhī plate of the Pāls,* or the inscription in the pillar in the Dīnājpur Rājbarī.† The २ in both Sen plates is the Bengali one, while in the Aṃgāchhī and Rājbarī inscriptions it is the Devanāgarī. क, ज, त, ढ, द, स, प, च, and most of the letters are identical in both Sen plates, and more Bengali than Devanāgarī; २, प, च, झ, are the same, and at first sight remote from either Bengali or Devanāgarī; ष, and य are undistinguishable in both plates, being nearer the Devanāgarī form than the Bengali, which appears first in the Buddha Gaya inscription,‡ engraved after the death of Lakshman Sen. The letters in which Lakshman Sen's plate appear nearer Bengali than the Aṃgāchhī plate of Vighraha Pal, are न, घ, भ, झ, २, and those in which Keshab Sen's plate seem to show a further step in the same direction, are ध, म, ग, ष, and the composite form of २.

The only inscriptions relative to the Sen kings quoted by Professor Lassen§ are the Keshab Sen plate and the Buddha Gaya inscription above mentioned. In the former the Professor makes a mistake between the names of Mādhab and Keshab Sen. The grant is made by Keshab Sen, son of Lakshman Sen, and, wherever the name of the grantor occurs, there are marks which Mr. Prinsep considered the signs of the erasure of another name. As the father's name remains unaltered, the name for which that of Keshab Sen was substituted, must be that of a brother, and, from the list of Sen kings given in the Aīn i Akbarī by Abul Faẓl, Mr. Prinsep suggests that of Mādhab Sen, which has the same prosodiaical value as Keshab.

I have, however, met with a notice of another copper plate, containing a grant by Lakshman Sen, which does not appear to be generally known. A transcript is given at page 371, Part II, of a Bengali work, entitled "A discourse on the Bengali Language and Literature" by Ramgati Nyaratna (Hooghly, Samvat 1930). The transcriber wrote, he says, not from the original plate, but from a copy in the Bengali character sent him by Bābu Hari Dās Datt, zamīndār of Mojilpur, and he admits that Holodhor Churamoni, who tried to translate it, could not read every letter of it, but supplied the gaps conjecturally. Comparing his transcript with my plate, I find that the discrepancies are so slight, that I attribute them to mistakes made either by the transcriber, or by one of the engravers of the original plate, and I find that the grants are, with variations of little more than single letters, word for word the same down to the word *bhuktyantah*

* As. Res., ix, 440.

† Ind. Ant., i, 126.

‡ Page 657, Vol. v, Journal, As. Soc. Bengal.

§ Page 746, Vol. iii, Indische Alterthumskunde.

pāti, after which different names of places and different boundaries are given. After identifying the land, the grant goes on, as mine does, with the words *samātabistah sajalasthalah sag*, where the page containing the remainder of the grant is missing.

Besides this, I hear that Mr. Beveridge has recently found a fourth copperplate of the Sen dynasty in the district of Báqirganj, but I regret not having seen it.

The grant which I am now discussing opens with an invocation to Náráyana, with which should be compared the epithet *paramabaishnava*, afterwards applied to the King making the grant.

The first stanza is an allusion to Siva, under the name of Sambhu, the various attributes of a fertilising cloud being compared with those of that deity, as depicted in the drawing of Ishwara, given on page 249, Vol. i, Asiatic Researches, namely, his matted hair, in which Basaki, the king of Serpents, is entwined, and from which Ganges flows, the crescent moon on his brow, the necklace of human skulls, and the humour of abstraction. I am bound to say that Bábu Mohesh Chandra Chakravarti, to whose assistance I am indebted for the translation, refuses to accept my reading of "necklace of white skulls" for *swetasiromálá*, saying that the expression must refer to a white garland on the head.

The second stanza is in honour of the moon, from which, in the *Chandra-vangsha*, the Sens evidently claim descent.

In the third, the poison of hostile kings is neutralised by the juice of some twining plant, to which the feet of the kings of the *Chandra-vangsha* are compared, a plant watered with the light of the gems on the coronets of prostrate kings.

The fourth stanza compares the effect produced upon their enemies by the Sen kings, with the influence of the season called *Hemanta*, the months of *Karttik* and *Agrahāyan*. Bábu Mohesh Chandra Chakravarti thinks Hemanta the name of an ancestor of the Sens. If so, he is not mentioned in Keshab Sen's plate. If he is a person, both he and Bijay Sen are spoken of as conquerors, but I can trace no reference by which to identify the dynasty supplanted, and to say whether it was or not that of the Pál kings of Gaur, one of whom, Vighraha Pál Deb, in the Amgáchhi plate, speaks of his dominions or a province thereof as *Paundra-Varddhana*, the name used by both Lakshman Sen and his son Keshab.

The first of the Sen kings mentioned by Abul-Fazl is Su Sen, whom he makes the immediate predecessor of Ballál Sen. I do not consider Abul-Fazl's authority worth much as regards the pre-Muhammadan dynasties of Bengal, and unhesitatingly accept the testimony of the copper plates, as to the name of Bijay Sen.

Negatively the plates support the theory that Ballál Sen was not, as

the Bengal traditions say, the son of Adisur, or of the wife of Adisur, who brought Kanauj Bráhmans into Bengal. It is true that Abul-Fazl places a dynasty of which Adisur was the first, and then all the Pál kings, between Adisur and the Sens, but as I have already said, I care little for Abul-Fazl's authority, and until I found that these plates failed to support it, I have been inclined to believe the Bengal tradition. The Chakravarti family, whose ancestor is said to have been one of the Bráhmans invited by Adisur, date his migration into Bengal, from family records, in the end of the tenth century of the Christian era, which would bring Adisur after the Páls, and, in a paper on the Pál kings, I have already said that it appeared very probable that it should be upon the fall of the Pál Buddhist dynasty, that Adisur should restore Bráhmans from the west, and that his successor, Ballál Sen, should continue the work by thoroughly revising the caste system, as he is, by a very general tradition, said to have done. I can only say that I get nothing to support this theory from the Sen plates.

Passing on to Ballál Sen, the expressions used are again disappointingly vague. He too is spoken of as a conqueror, and one who walked in the way of the Veda, but there is no allusion to his traditional labours in the organisation of caste, which have rendered him famous. Lakshman Sen, his son, who makes the grant, is said to have lived at Bikrampur, which I do not hesitate to identify with the old Bikrampur near Dháká. The Pandit employed by Mr. Prinsep has misunderstood the phrase giving the residence of Keshab Sen,* and I cannot from the lithograph read the name of the place. In the Monghyr grant the name is clear, *Mudgo-giri samábáshita srimajjayaskandabarát*; in the Ámgáchhí grant the word before *samábáshita srimajjayaskandabarát* is illegible. In my plate, *Bikrampur* is quite clear; in the Keshab Sen plate I cannot read it, but the Pandit reads it *Jambu-gráma parisar*, which represents no known place.

When the Muhammadans entered Bengal, A. D. 1203, they found the Sen King reigning at Nadiá, but for some generations their descendants retained some power in the neighbourhood of Bikrampur and Sunárgáon, and the indications of rebellious zamíndárs, against whom the Muhammadan rulers of Bengal from time to time led their forces into Eastern Bengal, probably refer to them.

The King is called *parameshwara paramabaishnaba parama bhattaraka*. The second of these phrases shows him to have been a worshipper of Vishnu, and in the Monghyr plate is replaced by *parama saugáta*, Deb Pal being a Buddhist. In the Ámgáchhí plate the epithet corresponding to this is unfortunately illegible. The Keshab Sen plate has apparently *paramasaur*.

* Page 50, Vol. vii, Journal, As. Soc. Bengal.

The title 'Lord of the Gaura,' or of Gaur, which the Pál Kings bore, does not occur in this plate, nor, I think, in the *Āmgāchhī* one, but in Keshab Sen's, he, his father, and his grandfather, are each called *Sankara gaureshwara*.

The term *pādanudhyāta*, 'meditating at the feet of', is shown by its use in at least a dozen plates to indicate the succession of a son to his father.

The list of princes and court officials who are ordered to respect the grant, correspond in some measure with other similar lists. Many of them occur in the Monghyr plate, translated by Wilkins (*As. Res.*, Vol. I) and annotated by Professor Lassen (*Indische Alterthumskunde*, Vol. iii, page 731), many in the *Āmgāchhī* plate, and many in the Basāhi plate, respecting which Bābu Rājendralāla Mitra has given his explanation at p. 327, Pt. I, Journ., As. Soc. Beng., 1873. I have not compared any other plates, but will note each officer's title with M., A., or B., as it occurs in one or other of the three plates I have mentioned.

Rājā (B.) must mean princes whom the SEN king considers subject to him.

Rājanyaka, may mean only persons of royal descent, or *Kshatriya*.

Rāgnī, (B.) may be either reigning queens, or queens-consort.

Rānaka, (M.) probably means queens' relations.

Rājaputra, (A., M.) kings' sons.

Rājāmātya, (A., *Amātya* M.) members of the king's council.

Purohita, (B.) domestic priest.

Mahādharmaśākhya, chief-justice, mentioned by Mr. H. T. Colebrooke, *Essays*, Vol. I, p. 495, ed. 1873.

Mahāsāndhibigrahika, (A.) a great officer for making treaties and declaring war. This officer, or a subordinate, is deputed at the end of the grant, to give effect to it.

Mahāsenapati, (A., Senapati B.) The chief commander of the army.

Mahāmudrādhikṛita, great mint-master. The title can scarcely mean anything else, though we know of no Bengal coinage previous to the Muhammadan conquest.

Antaranga, servant of the interior, or perhaps confidential servant.

Bṛihaduparika, (*Uparika* M., *rājast* (?) *ānoparika*, A.) This title in the Monghyr plate follows *Rājasthāniya*, and in the *Āmgāchhī* one the two seem to be combined. Of what this officer was superintendent, it is impossible to say. Professor Lassen thought he was overseer of the officers of criminal law, whose titles follow in the Monghyr plate.

Mahākshapataliḥa, (*mahākshapatalika* A., *akshapatalika* B.). Bābu Rājendralāla translates this title 'justiciary'; *aksha patala* meaning 'law-suit' and 'collection'. I think the officer may have been keeper of law-records.

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Mahapratihāra, (A., M., *pratihār* B.) great doorkeeper, probably commander of the bodyguard.

Mahābhogika, I think was probably an officer in charge of revenue, from a special right over the land called *bhoga*. The letter I have read *g*, is not quite clear, and might be *p* or *y*.

Mahāpīlupati. The word *pīlu* has several meanings, but this officer was probably head of the Forest Department of the Revenue.

Mahāganaska daussādika, (*mahādaussādhasādhanika* M.) Mr. Wilkins calls him 'chief obviator of difficulties'. Professor Lassen thinks him the same as *Mahāsādhanabhaga* in the Keshab Sen plate, and as *Sādharma* means 'material,' he considers this officer Minister of Public Works.

Chauroddharanika (M., A.) thiefcatcher; this was probably a military appointment, established to cope with the predatory bands which infested the country even within the last sixty years.

Gaulmika (M. and, I think, A.). The *gaulma* was a troop composed of nine elephants, nine chariots, twenty-seven horsemen, and forty-five foot-soldiers.

Dandopāshika, (M., A.) Wilkins translates 'keeper of the instruments of punishment'; it may, however, be derived from *danda* a staff, or mace.

Dandanōyaka, (A., *Mahādandanōyak* M.) was probably subordinate to the last.

Bishayapati, (M.) rendered by Wilkins 'governor of a city'. The word *bishaya* has so many meanings, that it is not easy to guess at the nature of the office indicated by this title.

The *Chattha Bhatta* caste, to whom, among others, the grant is addressed, are twice mentioned, the second time being where the grant of land is said to be free from the entrance of *Chattha Bhatta*. I see that *Chanda Bhanda* is the reading of Mr. Prinsep's pandit, and Professor Blochmann also,* accepts this as an improved reading. I can only say that the first part of the compound letter is most clearly ङ, and the second I think न, but it may be the vowel. The compound is certainly not ङन. Who the *Chattha Bhatta* were it is as yet impossible to say, but they formed probably the bulk of the cultivating population of the country, and I think it probable that the reason why the name has disappeared is that the *Chattha Bhatta* were made Muhammadans; for the Bengal Muhammadan, who cultivates in many districts more than half the land, is not the descendant of foreign conquerors, but betrays in many points a Hindu origin. *Chattha* and *Bhatta* I look upon as two distinct names, because I have seen the *Bhatta*, or *Batta*, written before the *Chattha*, instead of after.

In the Monghyr plate अचाटमट प्रवेश is enumerated among the things from which the grant is free, and Mr. Wilkins translates it 'no passage for

* Journal, As. Soc. Bengal, Pt. I, 1873, p. 226, Contributions to History and Geography of Bengal.

troops'. The Amgáchhi plate has the same expression, so has the Báman-gháti plate (p. 166, Pt. I, J. A. S. B., 1871).

The Keshab Sen plate speaks to the *Chatta Bhatta játiyán*, where it might perhaps be Chanda Bhandā, as the transcript is not clear; *Chatta Bhatta prabesh*, as here, and a third time, where it is illegible in the transcript. A plate from the Sioni District, Narbadá territories, at p. 729, Vol. V., Journ. A. S. B., has *abhatta chchhatra prabesh*, as read by Mr. Prinsep's pandit. I cannot read the character of that grant, and so am unable to pronounce it the expression I am looking for, but it is probably the same.

The expression *Paundra-Varddhana* appears to me to have much historical significance. The *Paundra* are, I believe, mentioned in Manu as a degraded race, that is to say, as I understand it, a race whose importance did not compel the Bráhmans to give it a high rank in the caste system, as they did to the Kshatriya. Of the *Varddhana* I do not remember to have met with any mention as a tribe or caste, but it occurs as part of the name of each king of one of the dynasties of Kashmír, and I think I have met with it elsewhere as part of personal names. The compound *Paundra-Varddhana* is the Sanskrit form to which Mr. Stanislaus Julien has reduced the Chinese name by which the pilgrim Hiouen Tshang calls an Indian kingdom which he visited in the seventh century of the Christian era. The position of this kingdom has been settled by Mr. Jas. Fergusson, in a paper published in the Journal of the Royal Asiatic Society, November 1872. The pilgrim followed the course of the Ganges to some place near Rájmahal. The Ganges has shifted so much, that it is quite impossible to identify this place, but I am very much inclined to look for it near old Gaur. The appearance of the country leads me to suppose that at some time previous to the Muhammadan conquest, the main stream of the river, instead of turning southward where it now does, ran east along the present Kálindri as far as Máldah, and then turned south, along the Mahánanda, running eastward of Gaur.

The direction in which Hiouen Tshang was travelling was eastward, and after following the course of the river as far as it took that direction, he would naturally cross it and turn his back upon it as soon as it turned to the southward. The only difficulty is to ascertain the point where the river changed its direction. After crossing the river, the Chinaman went 600 *li*, or from 100 to 120 miles, eastward, and found himself in the kingdom of *Paundra-Varddhana*. Mr. Fergusson quotes from a paper in the *Oriental Quarterly Magazine*, 1824, an account of *Pundra Desa*, abstracted from the *Brahmananda* section of the *Bhavishyat Purana*, from which it appears that the chief towns of the *Niveritti* division of *Pundra Desa*, comprising Dínájpur, Rangpur, and Koch Bihár, were *Verddhana Kuta*, *Kach-*

hapa, and *Sriranga* or *Vaharica*. *Paundra-Varddhana* was probably the division of *Pundra* or *Paundra Desa*, of which *Verddhana Kuta* was the capital. Eighty miles to the east of the place where I think it probable Hiouen Tshang may have crossed, or 100 miles from Rájmahal, close to Gobindganj, is a place marked in the map *Rájbári*, which is popularly known as *Borddhon-kúti*, and which is the residence of a zamindár of very old family, which 250 years ago possessed estates nearly, if not exactly, coterminous with Akbar's Sarkár of Ghorághát. I have tried to identify the name of Paundra with that of Sarkár Panjara, adjoining Sarkár Ghorághát on the north-west, but am not satisfied that I am right. 150 miles further eastward brought the pilgrim to the kingdom of Kámrúp, which, as Mr. Fergusson points out, probably means the capital thereof, Gauhatti, which lies a good deal to the north of east, from Borddhon-kúti, but perhaps not too much so for Hiouen Tshang to speak of it as to the eastward. The kingdom of Paundra-Varddhana extended from the Kosi in Púrniah to the Brahmaputra, and from the Ganges to the hills.

I do not think Paundra-Varddhana is mentioned in the Monghyr plate. Deb Pál addresses the Gaura as his principal subjects, as other Pál kings call themselves Gaureshwar, Gaurádhipo.

In the Ángáchhi plate, Vighraha Pál has the expression *Sri Pundra varddhanastha Kankodibasa bishayántahpáti*, and I have not yet discovered any allusion to the Gaura.

Keshab Sen (p. 45, Vol. vii, J. A. S. B.) says *Sri Paundra varddhana bhuktyántahpáti*, the same expression as Lakshman Sen's, where I take *bhukti*, as *bishaya* in the Ángáchhi plate, to mean 'province', as if *Paundra-Varddhana* were only a part of the dominions of the Sen kings. Keshab Sen has *bange Bikrampur* following the expression, as if *Banga*, or Eastern Bengal, in which Bikrampur was, were a part of Paundra-Varddhana.

The word *baredyán* in the text may stand for *barenyán* 'chiefs,' or for *bárendrán*, meaning the inhabitants of Barendra, a geographical expression which once applied to the tract I understand by Paundra-Varddhana, and which I believe now survives in the name 'Borind,' by which the hilly tract in Máldah, Dinájpur, Rájsháhi, and Bográ, is popularly known.

The law requiring such an edict as this to be upon silk or copper is quoted by Mr. Colebrooke. See Misc. Ess., II., 298; Digest of Hindoo Law, II. 278; As. Res., II. 50.

The word *dakshiná* is a technical word, to express the fee given to the priest on the occasion of certain ceremonies. This grant of land was made on the occasion of the king's giving away gold, horses, and chariots. Perhaps he had consecrated a gift of a car and horses for the *ratha játra*, a suggestion of mine, which the Pandit rejects.

The *gotra* of Bharadvája is the family descended from the *Rishi*, or

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The name *arhiya* is also used, nearly corresponding to the *káthá*. A *bíghá* takes six or seven *káthás* of seed, so the grant here recorded was, roughly speaking, about seven acres.

The produce is said to be 125 *purán* of cowries. It is not clear whether this refers to the gross produce or to the rent. Mr. Colebrooke's table gives

$$\begin{array}{rcl} 20 \text{ kapardak} & = & 1 \text{ kákiní} \\ & & \text{or cowree} \\ 80 & = & 4 = 1 \text{ pan} \\ 1280 & = & 64 = 16 = 1 \text{ purán.} \end{array}$$

The Dínájpur people say

$$\begin{array}{rcl} 4 \text{ cowree} & = & 1 \text{ ganda} \\ 80 & = & 20 = 1 \text{ pan} \\ 320 & = & 80 = 4 = 1 \text{ dām} \\ 1280 & = & 320 = 16 = 4 = 1 \text{ káhan} \end{array}$$

Thus the *káhan* of Dínájpur corresponds with the ancient *purán*, and as, when cowrees were last current, six or seven *káhan* went to the rupee, the annual produce of the land granted amounts to about twenty rupees, or, calculating roughly, a rupee a *bígha*. Average good arable land in Dínájpur pays a rent of a rupee or a rupee and a quarter per *bígha* at the present time, so the language of the grant probably refers to gross produce.

The land granted is to be all good land, of which none is unculturable waste, none is sacred to a god, none is taken up with cattle paths, and none is used, as large spaces near villages are, for latrine ground.

The *slokas* with which the grant concludes, occur repeatedly in other similar grants.

The date, the year 7, appears to refer only to the reign of the King, as is the case with most grants engraved on copper plates that have come to my notice.

The age of the grant may, however, be known by the character, and by the date of the subversion of the Sen dynasty, to be between 1100 and 1200 A. D.

The words following the date I take to be the name of the scribe or the engraver. Comparing this grant with that made in the next generation by KESHAB SEN, the only points requiring notice are the use by the latter of the title *Gaureshwar*, to which I have before alluded, and the attributing to KESHAB SEN sovereignty over the Asvapati, the Gajapati, whom I take to be the King of Orissa, and the Narapati.

The Buddhagaya inscription, to which I have previously referred, is shown by the character in which it is engraved to be later than this, and is dated after the reign of Lakshman Sen, in the time of Asoka Chandra Deb.

There is nothing to show what Lakshman Sen this may be, nor is there any connection known, I believe, between a King Asoka and the Sen dynasty of Bengal. The inscription contains an allusion to the triumph of the Lion over the Elephant, a device which occurs frequently in Hindu carving, and which appears to have some connection with the Pál dynasty of Bengal; but the subject is still obscure, and I cannot find that the Buddhagaya inscription throws any light on the history of Bengal.

Transcript.

श्री० नमो नारायणाय ॥

विद्युद्युव मणियुतिः फणपतेर्वालेन्दुरिन्द्रायुधं
 वारि स्वर्गतरङ्गिणीमितशिरोमाला वलाकावलिः ।
 ध्यानाभ्याससमोरणोपनिहितः श्रेयोऽङ्कुरोद्भूतये
 भूयाद्भूतः स भवार्जितापभिदुरः शम्भोः कपर्दीश्वरः ॥
 ध्यानन्देऽ(A.) मृनिधौ चकोरनिकरे दुष्खन्धिदात्यन्तिकी (B.)
 कल्लारे हतमोहता (C.) रतिपतावेकोऽ(D.) हमेवेतिधोः ।
 यस्याभी चसुतात्मनः समुदयन्याशु प्रकाशाज्जग-
 त्यन्ते (E.) ध्यानपरम्यरापरिणतं ज्योतिसदास्मान्मदे ॥
 सेवावनमस्तपकोटिकिरीटरोचिरस्त्रजसत्पदनखद्युतिबल (F.) रीभिः ।
 तेजोविषज्वरमुषेद्विपतामभूवन् भूमीभुजः स्फुटमथापधिनाथवंशे ॥
 आकौमारविकस्वरैर्दिशिदिशि प्रस्यन्दिभिर्दोयेशः-
 प्राप्तेयैररिराजवक्त्रनलिनस्थानीः समुन्मीलयन् ।
 हेमन्तः स्फुटमेय (G.) सेनजननलेवौघपुण्यावली-
 शालिस्तुः प्रविपाकपीवरगुणस्तेषामभूदंशजः ॥
 यदीयैरद्यापि प्रचितभुजतेजःसुहचर-
 र्यशेभिः शोभन्तेपरिधिपरिणदा दव दिशः ।
 ततः कां (H.) चीलीलाचतुरचतुरभोधिहरी-
 परीतोर्ध्वोर्भर्ताजनिविजयसेनः स विजयी ॥
 प्रत्यूहः कलिसम्पदामनलमेवेदाय नैकाध्वगः
 सङ्ग्रामः त्रितजङ्गमाकृतिरभूदलालसेनसतः
 यथेतोमयमेव शैर्यविजयी दत्तैषधं तत्तत्तत्त-
 दक्षीणा रचयांचकार वशगाः स्वस्मिन् परेषां त्रियः ॥
 संभक्तान्यदिगङ्गनागणगुणाभोगप्रलोभादिशा-
 मीशैरंशसमर्पणेन घटितस्तत्प्रभावस्फुटैः ।
 दोरुष्मलपितारिसङ्कररसोराजन्यधर्माद्ययः
 श्रीमज्जल्लसेनभूपतिरतः सौजन्यसीमाजनि ॥
 शश्वदन्धमयादिमुक्तविषयास्तन्मावनिष्ठोक्त-
 खान्ता यान्तु कथं न नाम रिपवस्तस्य प्रयोगाज्जयम् ।
 यैरात्मप्रतिविम्बितेऽपि (A.) निपतत (I.) वेऽ(A.) पि चंचनृणेऽ(A.)
 प्यद्वैतेन यतस्ततोऽ(A.) पि स परोदेवः परं बी (J.) चते ॥

स खलु श्रीविक्रमपुरसमावाजित(K.) श्रीमज्जयस्कन्धावारात् महाराजाधिराज श्रीवल्लभसे-
नदेवपादानुध्यात परमेश्वर परमवैष्णव परमभट्टारक महाराजाधिराज श्रीमल्लक्षणसेनदेवः
कुशली, समुपगताशेषराजराजन्यक राज्ञीराणक राजपुत्र राजामात्य पुरोहित महाधर्मा-
ध्यक्ष महासांख्यविग्रहिक महासेनापति महामुद्राधिकृत चान्तरङ्ग दृढदुपरिक महाक्षपट-
लिक महाप्रतीहार महाभोगिक महापीलपति महागणस्कंदौस्त्राधिक चौरौद्धरणिक
नौवल्लहस्यश्रीगोमहिषाजाविकादिव्याप्तक मौलिक दण्डपाशिक दण्डनायक विषयपत्यादीन्
वर्ण्यांश्च सकलराजपादोपजीविनो(A.)ऽध्यक्षप्रचारोक्तानिहाकीर्तितान् चट्टभट्टजातीयान्
जनपदान् क्षेत्रकरांश्च ब्राह्मणान् ब्राह्मणोत्तरान् यथार्हमानयति बोधयति समादिशति च
मत्तमसु भवतां यथा श्रीपौण्ड्रवर्द्धन भक्त्यन्तपाति वरेद्यान् । पूर्वे बृहद्विहारी देयता नकर-
देयास्मिन् भूम्यादावापपूर्वालिः सीमा दक्षिणे निचडहार पुष्करिणी सीमा । पश्चिमे नन्दिह-
रिपाकुली सीमा उत्तरे सोमनाथखाडी सीमा इत्थं(L.)चतुःसीमावन्धिद्रुतव्यदेश व्यवहारन-
(M.)लिन देव गोपथाद्यसारभवत्तिः पञ्चान्मानाधिक विंशत्युत्तरादावापशतैकात्म्यः संवत्सरेण
कपटक पूरण सार्द्धशतैकात्म्यतिको विलिङ्गिष्टीपामीयभभागः समाष्ट विटपः सजलस्त्रुतः
सगर्तोपरः सगुवाक नारिकेलः सद्यः शापराधः परिहृते सर्वे पीडोऽचट्टभट्टप्रवेशोऽकिंचि-
त्प्रपाद्यस्तुण् यति गोचरपर्यन्तः उताशनदेवशर्मणः प्रपौवाय माकण्डेयदेवशर्मणः पौवाय
लक्ष्मीधरदेवशर्मणः पुवाय भारद्वाज सगेवाय भारद्वाज आङ्गिरस वार्हस्पत्य प्रवराय
सामवेद कौशुम शाखाचरणानुष्ठायिने हेमास्यद(N.)थमहादानाचार्यश्रीईश्वरदेवशर्मणेपुण्ये
ऽहनि विधिवदुदकपूर्वकं भगवन्तं श्रीमन्नारायण भट्टारकमुद्दिश्य मातापिवोरात्मनश्च पुण्य-
यशोऽ(A.)भिष्टदये दत्तहेमाश्वरथमहादाने दक्षिणालेनोत्सृज्य आचन्द्रा(A.)र्हं क्षितिसमकालं
यावत् भूमिच्छिद्र न्यायेन ताच्च शासनीकृत्य प्रदत्तोऽस्माभिः॥ तद्भवद्भिः सभै(O.)रेवानुमन्तव्यम् ।
भाविभिरपि नृपतिभिरपहरणे नरकपातभयात् पालने धर्मगौरवात् पालनीयम् । भवन्ति-
चात्र(P.)धर्मानुगमिनः श्लोकाः । 'वडभिवंसुधा दत्ता राजभिः सगरादिभिः । यस्य यस्य यदा
भूमिस्तस्य तस्य तदा फलम् ॥ भूमिं यः प्रतिगृह्णाति यस्य भूमिं प्रयच्छति । उभो तौ पण्य-
कर्माणां नियतं स्वर्गगामिनौ ॥ स्वदत्तां परदत्तां वा यो हरेत् वसुं धरां । स विष्टायाः(Q.)
हृदिभूत्वा पिष्टभिः(Q.)साह पच्यते'(R.)॥ इति कल्लदल्लाम्बुविन्दुल्लालां त्रियमनुचिन्त्य मनुष्य
जीवितं च । सकलमिदमुदाहृतं च बुद्धा न हि पुरुषैः परकीतयो विल्लायाः ॥ श्रीमल्लक्ष-
णसेनो नारायणदत्त सांख्य विग्रहिकम् । इह ईश्वर शासन दाने द्रुतं व्यधत्त नरनाथः ॥
सं ७ भाद्रदिने २ । श्रीनिमहासार्गि ॥

Notes on the Transcript.

- A. Insertion of *§*, suggested by Mohesh Chandra Chakravarti.
- B. कौ for का or की, M. C. C.
- C. *hata* for *hata*, M. C. C.
- D. Insertion of *§*, M. C. C.
- E. *ante* for *antre*, M. C. C.
- F. Double the *l*, M. C. C.
- G. For *meya* read *meba*, M. C. C.
- H. M. C. C. writes the *anuswara* and *ch* instead of the compound *neh*.
- I. *Tpa* for *ttha*, M. C. C.
- J. *kshya* for *ksha*, M. C. C.
- K. *bdsita* for *bdsrita*, M. C. C.
- L. *त्य* for *द्य*, M. C. C.



M. ऋ for न, M. C. C.

N. M. C. C. reads *hemdscharātha* for *hemdsyadatha*.

O. *sarbbai* for *sarbbai*, M. C. C.

P. *Dharmmānuśsanah slokāh* for *dharmmānugasinah glokah*. The engraver's blunder is obvious.

Q. Insertion of *;*, M. C. C.

R. *saka* for *adha*, M. C. C.

Translation.

Om! Salutation to NARAYANA†

I. May the germ of your prosperity be developed by the cloud which is the clustered hair of SAMBHO, by whom the sorrows and pains of the world are done away, the cloud whose lightning is the flash of the jewel of the serpent king, whose INDRA-BOW is the crescent moon, whose water is the river of heaven, and along which a row of herons fly, the necklace of white skulls, and whose collected air is constant meditation!

II. May you rejoice in the light of the moon, full of nectar, at whose appearance the sea is glad, partridges cease to fear, and the husband of Rati* boasts himself peerless, the moon, which, after long series of meditations, has been proved to be always full!

III. The kings of the race of AUSHODHINATH† neutralize the sharp fever-poison of their enemies by the lustre of the nails of their feet, as with the juice of creepers, nurtured (as plants with water) by the lustre of the diadems of numbers of kings, prostrate in homage.

IV. Of that race sprang HEMANTA, in the fame of whose arms, resplendent on all sides from his infancy, the faces of the kings of his foes withered as the lotus blossom shrivels with frost, and in whose qualities the virtues of the house of SEN reached their highest development, as autumn matures‡ the rice in the fields.

V. Then BIJAY SEN, the victorious, whose mighty arms to this day clothe the four quarters of heaven with the light of the fame that attends them, became lord of the earth which the waves of four oceans girdle as with an undulating zone.

VI. Next was BALLAL SEN, an active foe to the influence of the Iron Age, walking in the path of the Vedas, an incarnation of war, who by means of his victorious heroism in a moment brought into his own hands the wealth of his enemies, undiminished.

VII. LAKSHMAN SEN, the King, formed by contributions of parts of the Lords of the quarters of heaven, who longed for the love of the Nymphs of the quarters, by the power of his arms quelling the tone of war in his enemies, holding to the virtue of the Royal race, became a standard of courtesy.§

VIII. His enemies again and again freed themselves from the ties of the world, in the same way withdrew themselves from worldly matters, and in the shade looked on him as a god and in fear of him trembled at every berry that dropped and every blade of grass that rustled.

* Kandarpa.

† The Moon.

‡ The name of Hemanta suggests the season so called, the autumn months of Kartik and Agrahayan.

§ The heaven is divided into ten quarters, each embodied in a nymph, and each having its Lord, of whom Indra is one. It is a popular fiction that kings are made up of parts of these Lords.

14 E. V. Westmacott—*A Copperplate grant by Lakshman Sen.* [No. 1,

[Prose.] Truly the good lord, good worshipper of Vishnu, good king, the prosperous SRI LAKSHMAN SEN DEB, meditating at the feet of SRI BALLA'L SEN DEB, from out of his victorious camp, resident at BIKRAMPUR, to all who are present, Rájá, Rájanyaka, Rágni, Ránaka, Rájaputra, Rájamátya, Purohita, Mahádharmmádhyáksha, Mahásándhibigrahika, Mahásenápati, Mahámudrádhikrita, Antaraṅga, Brihaduparika, Mahákshapatalika, Mahápratihára, Mahábhogika, Mahápílupati, Maháganas-kadaussádhika, Chauroddharanika, to those in charge of the ships, the elephants the horses, the cattle, the buffaloes, the goats, the sheep, and the rest; to the *Gaulmika*, the *Dandapádhika*, the *Dandandiyaka*, the *Bishayapati*, and the like, the foresters, and all who earn their livelihood at the feet of the King, all who carry out the published orders of governors, persons of the caste of CHATTA BHATTA, the countrymen, the cultivators, BRAHMANS, other than BRAHMANS, [I am not sure that this is the meaning of *Brahmanottarán*] to all persons worthy of esteem, men of understanding, men who issue orders, to all chiefs who have tenures in SRI PAUNDRA-VAEDDHANA, we proclaim that by us is given, by means of this copper decree, according to law, a piece of land, so long as the earth with the sun and moon endure, given up as a priest's fee, on account of the ceremony of my giving away gold, horses, and chariots, for the increase of my reputation for good deeds, and that of my father and mother, with my mind fixed on the Lord Náráyan, in the day of good deeds with the proper rite of pouring water, unto SRI ISHWAR DEB SHARMMAN, my preceptor in the ceremony of the great gift of gold, horses, and chariots, in the following of the Kaithuma treatise of the Sam Veda, he with the Prabara of Bháradvāja, Angirasa, and Bháraspatya, of the Gotra of Bháradvāja, son of LAKSHMAN DHAR DEB SHARMMAN, which was son of MARKKANDEYA DEB SHARMMAN, which was son of HUTASHAN DEB SHARMMAN. I give, with all pasture and forest, with water and land, with salt-pans, with betel nut and cocoanut, with fines for crime, exempt from all annoyance, from the entrance of Chatta Bhatta, a small acceptable portion [*kinchit pragrdhya*; the reading is doubtful, and the meaning still more so] within recognised limits, a share in the land of the village BILAHISTI, bounded on the east, by the eastern *ail* of the rent-free *aman* and given to the god BUDDHA BILARI, which is sown with an *árhá* of seed, on the south by the tank of NICHDAHA, on the west by the well NANDI HARIPA, and on the north by MOLLA'N KHARI, [The ravine of the Lotus] this land so bounded, apart from unculturable land, foul with use, endowments of gods, and cattle tracks, sown with a hundred and twenty-five *arha*, and producing yearly a hundred and fifty *purán* of *kauris*.

By you all that is to be enjoyed. By all future kings to be respected, to keep up the reputation of virtue, and from fear of falling into hell if they take it away, to this effect are the following *sloka* from the Dharma anusásan.

Slok 1. Lands have been granted by many kings, including Ságar and others; to whomsoever belongs the land, his is the produce thereof.

This *slok* occurs as No. 2. in the Monghyr copper plate, page 127, vol. i, Asiatic Researches, where, however, the latter half is either different or differently rendered. It is No. 1 in the Ámgáchhí plate, where the engraver has put *yasya* for the first *tasya*. It is No. 2, and No. 4, respectively in the two grants from Basáhi, translated by Bábu Rájendra-lála Mitra, pp. 323, 328, J. A. S. B., 1873, except that *bhukta*, 'enjoyed' is read for *datta*, 'granted.' It is No. 1, in each of the two Chaibásá

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plates translated by Bábu Pratápachandra Ghosh, pp. 167, 169, J. A. S. B., 1871.

Slok 2. Both he who receives and he who makes a grant of land, are equally virtuous in deeds, and go ever to paradise.

Nos. 4 and 1, of the above grants, pp. 323, 328, J. A. S. B., 1873, except that *básinau* is read for *gáminau*. No. 2, of the *Ámgáchhí* plate.

Slok 3. He who taketh away land granted by himself or by others, rots with his parents, like a maggot, in filth.

No. 3 of the Monghyr grant, No. 4 of the *Ámgáchhí* one. Nos. 3 and 7 of the two Basáhi plates. Nos. 4 and 3 of the two from Chaibásá. In some *majjati*, 'sink', is read for *pachyati*, 'rot'.

Slok 4. Think that the wealth and the life of man are unstable as a drop of water on a leaf of the lotus; considering all this as an example, the noble deeds of others should not be lessened by a man.

No. 4 of the Monghyr grant; No. 6, of the *Ámgáchhí*; No. 5, in each of the *Bámangháti*, or *Chaibásá*.

Sri Lakshman Sen, the Lord of men, hath deputed Náráyana Datta, the *Sandhi bigrahik*, to give effect to this *Ishwara Sason*.

In the year, 7, the third day of Bhadra. Sri Nimahásáni.

Krishna-cultus in the Br̥hat Samhita.—By PRANNA'TH PANDIT, M.A.

Professor Weber* in a passage approvingly quoted by Dr. Lorinser† in the appendix to his edition of the Bhagavad Gita, says that *the worship of Krishna as sole god is one of the latest phases of Indian religious systems, of which there is no trace in Varáha-Mihira, who mentions Krishna, but only in passing.* I would, however, draw the attention of the learned Professor to a passage in the fifty-eighth chapter of the *Br̥hat Samhita*, which is perhaps the identical one which he had in view when he penned the words italicised above. The passage is this :—

कार्योऽष्टभुजो भगवान् चतुर्भुजो द्विभुज एव वा विष्णुः ।
 श्रीवत्साङ्कितवचाः कौस्तुभमणिभूषितोरष्कः ॥ ११ ॥
 अतसीकुसुमश्यामः पीताम्बरनिवसनः प्रसन्नमुखः ।
 कुण्डलकिरीटधारी पीनगल्लोरःस्त्रलांशभुजः ॥ १२ ॥
 खड्गगदाशरपाणिर्दक्षिणतः शान्तिदस्तुर्धरः ।
 वामकरेण च कार्मुकखेटकचक्राणि शङ्खश्च ॥ १३ ॥
 अथ च चतुर्भुजमिच्छति शान्तिद एको गदाधरश्चान्यः ।
 दक्षिणपार्श्वे ह्येवं वामे शङ्खश्च चक्रश्च ॥ १४ ॥

* Indische Studien II., 298, &c.

† Indian Antiquary, Vol. II., p. 285.

द्विभुजस्य तु शान्तिकरो दक्षिणहस्तोऽपरश्च शङ्खधरः ।
 एवं विष्णोः प्रतिमा कर्तव्या भूतिमिच्छद्भिः ॥ २५ ॥
 बलदेवो हस्तपाणिर्मन्दविधमलोचनश्च कर्तव्यः ।
 विधत्कुण्डलमेकं शङ्खेन्दुमणालगौरवपुः ॥ २६ ॥
 एकानंशा कार्या देवी बलदेवकृष्णयोर्मध्ये ।
 कटिसंस्थितवामकरा सरोजमितरेण चेद्वहती ॥ २७ ॥*

31. Our Lord *Vishnu* may be represented with eight arms, with four, or with two arms, his breast being marked with the curl *Srivatsa* and adorned with the *Kaustubha* gem.

32. Darkish as the *Atasi* flower, clad in a garment of yellow-silk, a serene face, wearing earrings and a topped crown, and having the neck, chest, shoulders, and arms thick.

33. Holding in his right hands, a sword, a club and an arrow, while the fourth hand bestows blessings. In his left hands, a bow, a buckler, a discus and a conch.

34. If it be preferred to make *Vishnu* four-armed, then one hand bestows blessings, and the other holds a club; this much for the right side; in the left hands, the conch and the discus.

35. Of the two-armed image the right hand blesses and the other holds a conch. In this manner is the idol of *Vishnu* to be framed by those who desire prosperity.

36. *Baladeva* must be made having a plough in his hand, with eyes lively from dript, wearing a single earring; his complexion as the conch-shell, the moon, or lotus-fibre.

37. The goddess *Ekānamṣā*, should be made betwixt *Baladeva* and *Krishna* with the left hand resting on her hip, and with the other, holding a lotus.†

Further on we have a direction about *Sāmba*, *Pradyumna*, and their wives.

शम्भस्य गदाहस्तः प्रद्युम्नस्यापभृत् सुरूपय ।
 अनयोः स्त्रियौ च कार्यं खेटकनिक्षिप्तधारिण्यै ॥ ४० ॥

40. *Sāmba* holds a club in his hand; *Pradyumna* is handsome and holds a bow. Their wives too, are to be made holding in their hands buckler and sword.

Now as far as modern researches give insight to the development of the religion of the Hindus, there never was a period when *Sāmba* and

* Kern's *Bṛhat Samhita*, Bibl. Indica, 317, 318.

† In translating these passages I have principally followed Kern's version of this portion of the *Bṛhat Samhita* in *J. R. A. S.*, New series, Vol. VI., pp. 326, 327.

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Pradyumna had any independent status in their Pantheon, their wives being of course out of the question altogether. *Baladeva* too had more the position of a satellite to *Krishna* than that of an independent divinity. It would therefore be, to say the least, paradoxical if all these personages be raised to the rank of popular divinities, when *Krishna* himself is left out in the cold, and only thought worthy of an incidental mention.

The question may be viewed from another point. Our author has been giving detailed directions as to the mode in which various divinities are to be modelled or sculptured. He first tells us that *Vishnu* may be represented with eight, four, or two hands. He then gives us details about these allotropic modifications of that deity. We have then an account of *Balarāma*, and after that we are told that the goddess *Ekānamṣa* is to be represented in a certain posture between *Krishna* and *Balarāma*. Now nowhere in the chapter, or even in the whole work, are we told as to how *Krishna* is to be represented. I submit that we are bound not to inflict the odium of this omission on *Varāhamihira*, if we can help it.

The solution that I propose of these difficulties is this: I put it that *Varāhamihira* thinks that he has already described *Krishna*, when he has given us the description of the two-handed *Vishnu*. I see nothing which can be urged against this supposition, always leaving out of account the foregone conclusions of some writers that the *Krishna-cultus* must be post-Christian.

But there is still another passage in the *Bṛhat Samhita* from which, I contend, the conclusion is legitimate, that *Varāhamihira* recognised the identity of *Krishna* with *Nārāyaṇa*. *Krishna* had said in the *Gita*:

कालोऽस्मि लोकक्षयकृत् प्रहृदः ।*

which may be freely translated thus:

“I am time the potent destroyer”.

Pursuant perhaps to this general idea, *Varāhamihira*, in the one hundred and fifth chapter of his work, names the twelve months of the year after *Nārāyaṇa*.

सृगशीर्षाद्याः केशवनारायणमाधवाः सगेविन्दाः ।

विष्णुमधुसूदनाष्टौ विविक्तमो वामनश्चैव ॥ १४ ॥

श्रीधरनामा तस्मात् सङ्ख्यीकेशश्च पद्मनाभश्च ।

दामोदर इत्येते मासाः प्रोक्ताः यथासङ्गम् ॥ १५ ॥

मासनाम समुपोषितो नरो द्वादशीषु विधिवत् प्रकीर्तयन् ।

केशवं समभिपूज्य तत्पदं याति यत्र न हि जन्मजं भयम् ॥ १६ ॥†

14. *Mrigas'irsha* and the rest are *Keshava*, *Nārāyaṇa*, *Mādhava*, *Govinda*, *Vishnu*, *Madhūsūdana*, *Trivikrama*, and *Vāmana*.

* *Gita*, XI, 32. Also quoted by *Vijñāna Bhikshu* while commenting on the last of the *Sankhya Sūtras*.

† *Kern's Bṛhat Samhita*, pp. 503—504.

15. *Sṛīdhara* and then *Hṛishīkesha* and *Padmanābha* and *Dāmódara*. These are the months told in their respective order.

16. A man fasting on the twelfth day of each lunar fortnight, duly reciting the names of the months and worshipping *Keshava*, attains that place where there is no fear arising from birth.

The whole tenor of the passage makes it plain that the twelve names predicated to the months of the year are so many synonyms for *Nārāyaṇa* or *Vishnu*. Now some of the synonyms given here have no meaning unless they be applied to *Krishna*. If we succeed in establishing this proposition, the conclusion is irresistible that *Varāhamihira* identified *Krishna* with *Vishnu*. The synonyms on which I would lay stress are, *Keshava*, *Mādhava*, *Govinda*, and, last but not least, *Dāmódara*.

Keshava. The usual grammatical etymology of this word traces its origin to *Kéśa* (hair) and the possessive affix *va*, as may be seen from *Bhat-togi's* commentary* to *Panini*, V. 2. 109, and *Ujjaladatta's* commentary† to *Unnadi Sūtras*, V. 33. *Kshīraswamī* in his commentary‡ on the *Amera-Kosha* following these authorities says: प्रशस्तः केशः सन्त्यस्य केशवः । केशादेऽन्यतरस्याम् । In the *Vishnu Purāṇa* (Book V., Chap. XVI.) however, another etymology is given accounting for the fact of *Krishna's* getting the appellation of *Késava*. "For this that thou hast slain the impious *Kes'in*, thou shalt be known in the world by the name of *Kes'ava*."§ If preference is to be given to this etymology, *Kes'ava* would be meaningless unless *Krishna* be intended.

Mādhava. *Kshīraswamī* gives two derivations. The one is सायः स्रक्चः षवे भर्ता साधवः । ; the other is मधेरपत्यं वा । The following passage from the *Vishnu Purāṇa* (Book IV., Chap. XI.) throws light on the latter etymology. "The son of *Vrishā* was *Madhu*; he had a hundred sons, the chief of whom was *Vrishni*, and from him the family obtained the name of *Vrishni*. From the name of their father, *Madhu*, they were also called *Mādhavas*; whilst from the denomination of their common ancestor *Yadu*, the whole were termed *Yādavas*."|| If we are to follow this view of the subject, *Mādhava* can be predicated to *Nārāyaṇa*, only when he is identified with *Krishna*.

Govinda. The word *go* in Sanskrit is a veritable *Kāmadhēnu*. *Medi-nikara* gives a dozen meanings for it. The derivation of *Govinda* given by *Kshīraswamī* is as follows: गं भुवं विन्दतीति गोविन्दः । वाराहरूपेणोद्धारान् ।

* Taranatha's *Siddhanta Kaumudi*, Vol. I., p. 683. Second edition.

† Aufrecht's *Unnadi Sūtras*.

‡ Sanskrit MS. No. 664, in the Society's Library, leaf 7, p. 1.

§ Wilson's *Vishnu Purana*, London, 1840, p. 540. The passage is also quoted by *Bharata Mallika* in his commentary on the *Amera Kosha*, Sanskrita MS., No. 188, in the Society's Library, p. 19.

|| Wilson's *Vishnu Purana*, p. 418.

Considering, however, the primary signification of *go* (bull or cow), the etymology propounded in Vishnu Purāna (Book V., Chap. XII.) is more satisfactory. "I have now come by desire of cattle, grateful for their preservation, in order to install you as Upendra; and, as the Indra of the cows, thou shalt be called Govinda."* Even if we were to take the word only in the sense of a cow-herd,† it would be meaningless when applied to Vishnu independently of Krishna.

Dāmōdara. *Kshiraswāmi* derives it thus: दाम उदरे यस्य दामोदरः बाह्ये हि चापत्यादाम्ना बद्धोऽभूत् †. The story is to be found in the Vishnu Purana, Book V, Chap. V. "It is hence that Krishna is called Dāmōdara, from the binding of the rope (dāma) round his belly (udara).‡ There is another§ etymology which ascribes this name to *Krishna's* taking a large quantity of food. Whichever of these derivations be preferred, the term can apply only to Krishna.

From an attentive consideration of the facts and authorities here adduced, we cannot resist the conviction that in Varāhamihira's time Krishna had been identified with Vishnu. I hope an attentive perusal of the other works of the same author will confirm this opinion.

The Alti Hills in Cuttack.—By JOHN BEAMES, B. C. S., *Magistrate of Cuttack.*

(With four plates.)

These hills are a perfect mine of archæology, and one which has not yet been thoroughly explored. An article on them appeared in Vol. XXXIX, of the Society's Journal (for 1870, p. 158), by Bābu Chandra Sekhar Banerjea, then Deputy Magistrate of the Jājpur Subdivision, but his article is not intended to be exhaustive. It gives a very accurate and interesting general account of the hills and their treasures, but the learned author expressly states that his article is not to be considered as more than an outline of the subject. My attention was drawn to these hills by the article in question, and I had been for some time anxious to visit them. This cold weather my official duties fortunately admitted of my taking my camp close to them, and I am thus enabled to supply a further instalment of information.

* Wilson's Vishnu Purana, p. 528 and note.

† Muir's Original Sanskrit Texts, First Edition, Part IV, pp. 183, 206 note.

‡ Wilson's Vishnu Purana, p. 509.

§ Muir's Original Sanskrit Texts, Part IV, p. 175.

Alti is unfortunately very inaccessible. The parganah of that name, in which the hills are situated, is surrounded and intersected by rivers. On the north-east flows the Kimiriyá, an offshoot of the Bráhmañi, on the south the Birupá, an arm of the Mahánadí. These two unite at the south-east angle of the parganah and form a third river the Keluá, and the whole tract is further cut in two by the Gangútí, a stream which issues from the Birupá in the south-west and falls into the Kimiriyá just above its junction with the Birupá. Thus a river has to be crossed in reaching the hills from any direction, and as there are very few boats on the Orissá rivers, and those that do exist are not suitable for crossing horses, it is a difficult business to reach them. The hills or rather hill, for it is only one, lies between the Gangútí and the Birupá, about 30 miles north-east of the town of Cuttack. To the south of the Birupá, and about 3 miles from the main mass of Alti, lies the Nalti group, consisting of one long hog-backed hill with a depression in the centre and a small knoll rather isolated on its southern side. The derivation of the name of this hill from لعنة, 'a curse', and the legend connected with it, seem to be a pure invention of some marvel-loving and ingenious Muhammadan. The name is not Náltí, which would be the Uriya inversion of La'nati, but Nálti with short *a*, and seems to correspond to Alti just as the two parganahs of Awartak and Anáwartak a little further to the south, where the prefix an (Sanskrit अण्) means "small," so that Nalti, for Analtí or Anvaltí, would simply mean "little Alti". If the Hindus of Orissa had wished to designate the hill as cursed, they would not have used a little known Arabic word like *la'nat*, but their own ordinary word *s'ráp*; nor is it likely that the very scanty and insignificant Musalmán population would have been able to have affixed a name derived from an obscure legend on the hill and Hindu village. The legend is of itself extravagantly absurd; for it was not the prophet Muhammad, as the Bábu says, who cursed the hill, but the great king Solomon. It is not the prophet who is represented in Muslim legend as flying through the air, but king Sulaimán-bin-Dáúd, whose magic ring gave him power over the Jins, and who was in the habit of flying through the air on his magic prayer carpet. The mosque on the Alti hill is called the "Takht i Sulaimán," and the custodian thereof as he told me the legend, attributed the curse to Sulaimán.

The antiquities noticed by the Bábu on the Nalti hill are ruined temples too much dilapidated to yield any interesting results, with the exception of the temple mentioned at the bottom of page 159. I made a sketch of this (plate V). The five figures of Buddha stand in niches on the outer side of the walls of the cell, one of them is visible on the right hand of the sketch. They are executed in bold relief on large slabs of garnetic gneiss, but the inscriptions are not visible, being concealed by the walls. The temple itself is now dedicated to Básuli Thákuráni, who is represented by a

rudely shaped clay model of a human face, covered with red paint and draped in coarse dhoties. The images of Buddha are all exactly alike and are fine pieces of sculpture. I give a sketch of one of them (plate VI). I had no time to explore the other recesses of this hill, but hope to do so on a future occasion.

The mosque of Takht i Sulaimán stands on the southern face of the Alti hill, 2500 feet up. Its white walls form a conspicuous mark on the hill side which can be seen for many miles to the south. The ascent is from the east and consists of a steep road paved with rough stones, which still retain some semblance of steps. The mosque of which I made a sketch (plate IV) is a plain stone building standing on a small platform, and on its southern side on the edge of the precipice is the sacred tank, a small shallow hole about 10 feet by 8 and 3 deep, cut in the rock. It is now dry, but the legend is, that it was formerly a spring of water formed by Sulaimán's striking the rock with his staff. The tank was full of water till Shuja' uddin's time, so said my informant, when a soldier of his army having outraged a female pilgrim to the shrine, the '*lymphe pudica*' dried up and has never flowed since. The soldier and his unchaste companion, or his victim, for it is not clear whether the lady consented or not to the act, were buried at the foot of the hill, and every passer-by throws a stone on the grave, which has thus become a huge mound or cairn by the road side.

The following is the inscription on three slabs of chlorite, one over each door of the mosque—

چون شجاع الدین محمد خان بساخت • بقعة کزوی بدآبد نور دین
سال قاریخش ایچتم از خرد • تا شود سال بنای او صمدین
دست بردار از سر جهد و بگو • گفت داتف رشک فردوس برین

'When Shujá'-uddín Muhammad made this shrine, that from it might shine the light of religion,

'I sought from my heart the year of its tárikh, that the building of it might be made evident.

"Cease from the endeavour, and say," quoth the inspiration, "[It is] the envy of the highest Paradise."

Date A. H. 1132, as given by the Bábu. A. D. 1719-20.

The hill on which this mosque stands is called by the Hindus *Boro dihi*, बड़ दीहि, or 'great site,' and was according to local tradition the seat of the palace of some great king; but who he was or when he lived, authorities are not agreed. The Birupá flows past the southern foot of the hill, and on its banks are two huge stones weighing several tons. My informant, an old Hindu of some respectability, mentioned that he had heard in his youth

that the boundary of the two zamíndáris of Alti and 'Alamgír was at one time disputed, and the disputants were coming to blows about it, when these two stones rolled from the top of the hill and fixed themselves where they now lie. Both parties agreed to recognize the occurrence as a divine interposition and accepted the spot as the boundary line between their two estates; and the stones lie there to this day as the boundary mark; 'so it must be true', said the old man.

Passing on eastwards across a small valley we come to the Udaygiri, or Sunrise Hill, the first point in Orissa on which the sun's rays light every morning, in spite of the fifty miles of lowland between it and the Bay of Bengal. It is a conical peak with three long spurs stretching respectively north, north-east, and south-east; and clothed with dense vegetation, amongst which on the southern face are noticeable five or six immense *Plumeria* trees (*gul-chíní*) with their naked fleshy branches and overpoweringly fragrant white blossoms. In gardens I have never seen this tree more than 10 or 12 feet high, but below the mosque there is a group of them upwards of fifty feet in height, the flowers of which are dropped on to the pavement and offered by the *mujáwir* in front of the kibláh.

In the bay formed between the south-eastern and north-eastern peaks of Udaygiri is a sloping plain of bare laterite rock, on the edge of which stands a statue of Buddha upwards of 8 feet high. I give a sketch of the profile of this figure (plate VI, upper left hand corner) to shew the way in which it stands out from the slab on which it is carved. The nose as usual is broken, and the lower part of the figure mutilated and overgrown with lichen. All round lie numerous stone *samádhs*, marking the graves of Buddhist priests of by-gone times. There are several hundreds of these so closely resembling in shape large *lingas*, that I at first mistook them for such, till I noticed the small sitting figure of Buddha on the top. Passing from this over the broad stony plain, a small temple or "gumpa" is reached, and close to it is the celebrated well. This is cut in the laterite rock and is well described by Bábu Chandra Sekhar. The inscription is, however, as I make it out, not as he read it, but as follows:

बालक श्रीब्रजलालराय.

What it means it is difficult to say, but it occurs twice over, each time in letters six or eight inches long, of the ordinary Kutila type, and after looking at it a long time I am fairly certain of every letter. If it be a name *Brajalála*, then it is singular that the second ल should have been omitted in both cases. This could hardly be an accident.

The great glory of Udaygiri is the gateway of which I give a sketch (see plate III). It is just beyond the well, and after I had the jungle cut, stood out well against the background of trees and shrubs.

It consists of two upright slabs of stone, supporting a third as lintel. The dimensions are as follows :

	ft.	in.
Height of opening,	5	5
Breadth of ditto,	2	3½
Thickness of stone,	1	3½

The two side jambs are divided into bands separated by grooves, $\frac{1}{4}$ of an inch wide and $2\frac{1}{4}$ inches deep. The panel or band nearest the doorway is carved with a continuous wavy creeper up which human figures are climbing in grotesque attitudes, from the excessively *nitambini* outlines they are probably intended for females. The next band has a columnar type, and the capitals are those given by the Babu; but I append a more accurate drawing of them. The pilaster of the column is adorned with intricate arabesques and lion's heads. The next band is divided into tablets, each of which contains a beautifully carved group of a male and female figure engaged in what I may venture to call flirtation of an active kind. The beauty of these carvings is very striking, though they are much worn and covered with lichen (plate III); some indeed were so defaced that I could not make them out. The size of each tablet is 8 inches by 5. Just inside the gateway is the colossal Buddha, the size of which will be seen from the *chokidár* standing by. It is half buried in the earth in a damp gloomy pit and is noseless, as an Orissa statue ought to be who has heard the rattle of Kálápahár's kettle drum. (Plate V.)

With the permission of Bábu Rám Gobind Jagdeb, the zamindár of the estate, I am now engaged in having this beautiful gateway carefully removed by skilled workmen to Cuttack, where it will be erected in the Public Garden and taken care of. I hope to be able to get it photographed.

There are hundreds of statues and many temples on this hill, but owing to the limited time at my disposal and the denseness of the jungle, I was unable to carry my explorations further. I hope to do so on a future occasion.



*Who were the "Patan" or "Pathán" Sultáns of Dihlí?—By
Major H. G. RAVERTY, Bombay Army (Retired).*

There is a very important period in the history of India requiring particular attention, and some strong remarks, in order to correct an error, which, since I have been engaged upon the translation of the *Ṭabaḳát-i-Náṣirí*, has thrust itself upon my attention with greater force than ever.

It is an error which, for more than a century, has been handed down from one writer on Indian history to another, and re-echoed by others, their followers, upon all occasions. It has also misled many conscientious authors from their having placed reliance on the correctness of the translation of the commonest and most generally known history of India, in the Persian language, that is to be met with in India, and one which is tolerably well known to the generality of those educated Musalmáns who are acquainted with that language, and, to the translation of which nearly every English writer on Indian history has resorted down to this present day: and the error I refer to is still being industriously taught in our schools and colleges, both in England and in India.

I refer to the history of India, entitled *GULSHAN-I-IBRA'HI'MÍ*, by Muhammad Kásim Firishtah, and the translation I now more particularly glance at—I shall have to notice another, subsequently—is that by Dow, which I have noticed, and animadverted on, on a different subject, as well as on the present one, in my notes of the translation to the *Ṭabaḳát-i-Náṣirí*. The error to which I have alluded is the styling of *Ḳuṭb-ud-dín* of the Powerless Finger, the founder of—or rather the first of—and all the succeeding rulers of the kingdom of Dihlí, down even to the restoration of the Mughul emperor Humáyún, by the name of the "PATAN," "PATHA'N," or "AFGHA'N," dynasty.

This error, in the first instance, originated, I conceive, entirely from Dow, who, in 1768, published, what he styled, a translation of Firishtah's History, "the diction" of which he says, in his second edition, "in general, is rendered more connected, clear, elegant, and smooth." That translator also professes to have "clipped the wings of Firishtah's turgid expressions, and rendered his metaphors into common language," and further states that he "has given as few as possible of the faults of the author; but he has been cautious enough, not wittingly at least, to substitute any of his own in their place."

Notwithstanding these assertions, it was translated in such a manner as to make Gibbon suspect "that, through some odd fatality, the style of Firishtah had been improved by that of Ossian." Instead of clipping the wings of Firishtah, as Dow asserts, he is far more diffuse, and uses far more

turgid expressions ; and, as the late Sir H. Elliot says in his BIOGRAPHICAL INDEX, "his own remarks are so interwoven as to convey an entirely different meaning from that which Firishtah intended," and, "some of the commonest sentences are misunderstood, and the florid diction was occasionally used to gloss and embellish an imperfect comprehension of the original." This is, by no means, an overdrawn picture of the translation, but a very mild one, as I shall now proceed to show, particularly respecting those passages which have caused Turkish slaves, Khaljis, Jats, low caste Hindús, and Sayyids, to be turned into Patáns or Afgháns.

Dow commences his Preface with a blunder. He says (p. ix)—"Firishtah with great propriety begins the history of the Patan empire in Hindustan from the commencement of the kingdom of Ghizni." Firishtah says not one word throughout his history of the "Patan empire," much less the "Patan empire of Ghizni." Then again he says: "The Afgans or Patans had been subjects to the imperial family of the Samania"; and he further asserts, that they, "Samania", had revolted from the Caliphat [*khiláfat* probably], which, likewise, is not correct. See the Tabakát-i-Náṣiri's account of the Sámání dynasty, or the account given by any other Asiatic writer, for the absolute contrary is the fact: they were most loyal to the Khalífahs, and acknowledged their suzerainty upon all occasions, and, indeed, received the investiture of their dominions from the Court of the Khalífahs of Baghdád. Dow winds up his paragraph by saying that "they [the 'Afgans'] rebelled under Abistagi." Such a statement is neither to be found in Firishtah, nor in the work of any other historian. Firishtah's translator appears to have been as ignorant of the names of the personages therein mentioned as of the mode of spelling 'Afghán'; for who would imagine that *Abistagi* is meant for Alb-Tigín, or would be so read by any one who could read the original for himself?

At page x of his Preface he says, "The kings of the Ghiznian Patans were obliged to relinquish their dominions in the north, and to transfer the seat of their empire to Lahore," not because of the Ghúris, but because of the "Charizmian [Khwárazmí] rulers, and afterwards to Dilhi." Firishtah does not make any such assertion, nor will any other writer be found who states that any Ghaznawí ruler, much less a "Ghiznian Patan," transferred his seat of empire to Dihlí.

Then he says [pp. x and xi]—"The uncommon strength of the Patan empire in Hindustan at this period may be easily accounted for. It was the policy of the adopted Turkish slaves [which he nevertheless turns into "Afgans" or "Patans"] of the family of Ghor to keep standing armies of Mountain Afghans, under their respective chiefs, who were invariably created Omrahs of the empire." This the translator may have heard from ignorant Hindústánis with whom he came in contact, or he must have

judged from the state of India at the period in which he wrote, when Najíb-ud-daulah and other Patán chieftains kept bodies of their clansmen in pay. I challenge any one to name any single Afghán chief of any tribe of "mountain Afgháns," who was one of the "Omrah" during the sway of the whole Turkish Slave Dynasty.

Dow takes his introduction partly from Firishtah's introduction, although in the advertisement to the second of his translation he says, "Firishtah's account of the ancient Indians, and the invasions of the Muhamma-dans, before the commencement of the Ghiznian Empire, is omitted, and an introduction substituted in its place, more satisfactory, succinct, and agreeable," but a vast deal of the original is left out for obvious reasons; and a comparison of the two proves that the translation is full of mistakes, both in meaning and in the names of persons and places.

Under the reign of the Hindú king named Kíd and Kídár Ráj, whom Dow styles "Keda-*raja*," he has—"The mountaineers of Cabul and Candahar, *who are called Afgans or Patans*, advanced against Keda-*raja*, and recovered all the provinces of which he had possessed himself on the Indus. We know no more of the transactions of Keda-*raja*."

Here is what Firishtah states [page 22 of the lithographed text, which I have chosen for facility of comparison by others]. "After some time the Khokhars and Janjúhiáhs [the lithographed text here, however, has كهكران and چوبيه, which is evidently an error for كهوكهوان and جدچوهيه], tribes once very powerful, located in the hill tract of Makhiálah [the Salt Range] in the Sind-Ságar Doábah, who were amongst the [most] respectable zamindárs of the Panjáb, combined with the dwellers in the plains [nomads] and the mountains [hill tribes], between Kábul and Kandahár [the name of this place is not mentioned by any author up to the time of, and including, the author of the Tabakát-i-Násirí, and the place appears not to have been then known, at least by that name, until a considerable time subsequently], and came against Kíd-Ráj, and he, becoming helpless, left that tract of country in their possession. From that time, that people dispersed [the confederacy was broken], and the chief in each mountain tract appropriated it. Apparently (to Firishtah, but it is not entirely correct) *that people are the Afgháns which now are* [افغانان كه اكنون هستند]. There is not a word more said about them. A proof of what the historian quoted by Firishtah says of the Afgháns and other tribes of people in connection with them, which Dow and others make one race of, is contained in this sentence in the original text, p. 29, but it is entirely left out in Dow's version. Speaking of the Rájah of Láhor sending forces to coerce the Afgháns, he says: "On this occasion, the Khalj, and men of Ghúr and Kábul assisted them (the Afgháns)." Now, if these Khalj and Ghúris were Afgháns, as Dow would make out, why does Firishtah, like

many others his predecessors, however, name them separately? The reason is obvious, and he does so correctly.

After the utterance of some erroneous ideas as to why the Afghán country of Akbar's time was called Afghánistán, *centuries before it was so called*, Firishtah says: "The reason why the Hindus call them [the Afgháns] Paṭáns is not known, but it occurs to the mind that during the time of the Musalmán Sultáns [that is, those rulers who were styled Sultáns, prior to Bábar's time], when they [the Afgháns] first came into Hind, they having taken up their abode in the city of Paṭnah, the Hindús styled them Paṭáns." Here he shows his ignorance of the previous history of the Afgháns.

Alluding to the Rájah of Láhor coming to an accommodation with them [p. 30], and giving up to them sundry towns or villages in the Lamghánát, Firishtah says: "the tribe of Khalj, who dwelt in that desert tract [صحرا, in distinction from hill tracts, the more level tracts or plains] as hangers-on upon the Afgháns, he made co-partners [in possession of the lands] with them, on the stipulation that they, the Afgháns, should defend the frontier [of Hind, or his dominions], and not permit Musalmán troops to enter Hindústán. The Afgháns in the hills near Pesháwar constructed a stronghold which they named Khaibar, and, having possessed themselves of the territory of Roh, during the sway of the Sámání Maliks, they did not permit them [the Sámánis] to disturb the territory of Láhor, and hence, from first to last, their invasions and ravages were directed towards Sind and Bhaṭṭah." Firishtah then proceeds to describe Roh, as Afghán writers had previously done, including Khán Jahán Lúdí himself, a contemporary of Firishtah, and the author of a History of the Afgháns, from which work, in all probability, Firishtah took his description. Khán Jahán, who was of the Lúdí tribe of Afgháns, will not be found to have made Turks [including Khaljis] and Ghúris of them, and it may be presumed that he knew something at least about his own ancestor and people, as well as the author of the Táríkh-i-Sher Sháhi, which I shall have to refer to.

Firishtah then refers to Sabuk-Tigín, "who was the sipah-sálár of the forces of Alb-Tigín," but such was not the case [as shown in the Tabakát-i-Náṣiri, page 71], both of which chiefs Dow styles *Subuctagi* and *Abistagi* respectively. Firishtah appears to have been totally unacquainted with the names of Alb-Tigín's son, Is-hák, and of Balká-Tigín, and of Pírey, who held authority over Ghaznín and its dependencies before Sabuk-Tigín. "Sabuk-Tigín," he says, "was powerless in opposing [coercing?] the Afgháns; and afterwards he entered into a good understanding with them; but Mahmúd, his son, subdued and humbled them, put their chiefs to death, and compelled Afgháns to enter his service."

This last statement of Firishtah's, respecting Mahmúd's taking Af-

gháns into his service, *may be* correct, but it is doubtful, as may be judged from the expeditions against them undertaken by his gallant son Mas'úd, an account of which I have given from Baihaquí's *Tárikh* in my version of the *Ṭabaḳát-i-Náṣirí*, in note 7, para. 7, page 321, which see.

Firishtah, in his History, gives a detailed account of Sabuk-Tigín's descent, which he took from the *Ṭabaḳát-i-Náṣirí* verbatim, but this Dow leaves out entirely.

At page 50 of his translation, Dow has the following with reference to Mahmúd:—"In the following year, Mamood led his army towards Ghor. The native prince of that country, Mahommed of the Soor tribe of Afgans, a principality in the mountains famous for giving birth to the Ghorian dynasty." Briggs, in his version of Firishtah, follows Dow closely and, in some cases, verbatim, as I have also shown elsewhere; and, in this place, he perpetrates the same blunder; and these two translators are, no doubt, wholly responsible for thus leading their readers astray and causing them to blunder likewise, and to disseminate the incorrect statement that the Afgháns are Ghúris, who are Táziks or Tájiks, and claimed Arab origin. Briggs's version of the passage given above is thus [Vol. 1, p. 49]—"In the following year Mahmood led an army into Ghoor. The native prince of that country, Mahomed of the Afghan tribe of Soor (the same race which gave birth to the dynasty that eventually succeeded in subverting the family of Subooktugeen)," etc.

This statement on the part of Dow and Briggs is evidently the origin of the incorrect assertions of those who have had, and still have, recourse to their versions for materials for Indian history so called; indeed, as a writer in the *Bengal Asiatic Journal*, a few years since, wrote—"Hitherto for the pre-Mughul Muhammadan History of India we have been dependent on Firishtah. * * * * Elphinstone's History, for instance, is entirely based on that authority." The writer, however, should have said, dependent on the translators of Firishtah; for even where Firishtah is right, they have made him wrong. Elphinstone certainly quotes Dow and Briggs constantly.

What says Firishtah though? He says [p. 46]—"In the year 401 H., the Sultán [Mahmúd], having led an army into Ghúr, the ruler (حاکم) of that country, Muhammad, son of Súri [see translation of *Ṭabaḳát-i-Náṣirí*, page 321, and note 7-7], with 10,000 men in array, confronted the Sultán's ranks." There is not one word about the "Afghan tribe of Soor" nor the "Soor tribe of Afgans"; and it is from this particular passage in these two translations of Firishtah that the error arose of making "Patans" of all the rules of Dihlí down to Sultán Buhlúl of the Lúdí tribe, who is the first Paṭán or Afghán that sat on the throne of Dihlí.

A few lines under the above quotation, Firishtah refers to the *Tárikh-i-Yamíní*, and quotes the author of the *Ṭabaḳát-i-Náṣirí* with reference to

the conversion of the Ghúris to Islám, and says "but the author of the *Tabakát-i-Násiri* and *Fakhr-ud-Dín Mubárák Sháh* the *Marw-ar-Rúdí* [see my translation, page 301], who composed a history," etc.; but Dow leaves this out entirely, and Briggs, such seems the infatuation for viewing all things in a "Patan" light, translates the last part of the sentence [p. 50] "*Fakhr-ood-Deen Mubarik Lody who wrote a history*," etc. Instead of *Marw-ar-Rúdí* (مرو الرودي), he read *Lúdí* (لودی), the name of Sultán Buh-lúl's tribe, which, no doubt, he thought must be correct. People referring to these translations, and finding this statement reiterated, time after time, that the Ghaznawis and Ghúris were "Afgans or Patans", concluded that *Firishtah* must have so stated, and that he must be right, and so they wrote their accounts of "Patan Sultans," "Patan buildings," and "Patan coins," but they do not seem to have considered that, even if the Ghúris were Patáns, it did not follow that their Turkish slaves, and other Turks, and Tatárs, should also be Patáns. I do not doubt that many Persian scholars will be surprised to hear that there is nothing of the kind whatever in *Firishtah*, any more than there is in any other Asiatic writer, but such is the fact, and *Firishtah*'s text on examination will prove it.

Farther on [p. 132], Dow states: "The genealogy of the kings of Ghor, according to the most authentic historians, could be traced up, by the names, for three and twenty, and downwards nine generations, from Ali to Mamood, the son of Subuctagi," &c. There is nothing of the kind in *Firishtah*. He renders the names of their ancestors as *Minhá-j-i-Siráj*, and some others give them, name by name, down to *Zuhák the Tázi*, but Dow not understanding what followed, concealed the "nine generations" down to *Mahmúd of Ghizní*, to whom the Ghúris were no more related than they were to Dow himself. It was from this passage, I have no doubt, the author of "a Student's Manual of Indian History" was led into the error of calling *Mahmúd of Ghaznín* "the great ancestor" of Sultán *Mu'izz-ud-dín*.

I now pass from the Ghúris and their Turkish slaves, and their slaves, to the *Tughluk* dynasty, who are also included among the "Patans" and "Pathans" by English writers who follow Dow and Briggs.

At p. 295, vol. I, Dow says: "We have no true account of the pedigree of *Tuglick*. It is generally believed that his father, whose name was *Tuglick*, had been in his youth brought up as an imperial slave by *Balin*. His mother was one of the tribe of *Jits*. But indeed the pedigrees of the kings of the Patan empire make such a wretched figure in history," etc. Compare Briggs also here.

Firishtah says [page 230]—"The chroniclers of *Hindústán*, both the ancients and the moderns, being negligent, not one of them has recorded with the pen of certainty aught respecting the origin and lineage of the

Tughluḳ-Sháhi dynasty. The writer of these pages, Muhammad Kásim Firishtah, when, at the commencement of the reign of Núr-ud-dín Muhammad Jahángir Badsháh, he [Firishtah] on the part of the Sultán of the age, Ibráhím 'A'dil Sháh, reached the city of Láhor, he made inquiry of some persons of that place, who had a predilection for reading the histories of the sovereigns of Hindústán, and who were acquainted with the events [of the reigns] of the Sultáns of Hind, respecting the origin and lineage of the Tughluḳ-Sháhi sovereigns. They replied, [saying]—We, likewise, have not seen [anything] distinctly mentioned [on the subject] in any book [Ibn Batútah's account notwithstanding]; but, in this country [province?] it is currently stated that Malik Tughluḳ, the father of the Bádsháh Ghiyás-ud-dín Tughluḳ Sháh, was attached to the train of Turk slaves of Sultán Ghiyás-ud-dín Balban, and that he formed a connection with the Ját race, who are the aborigines [بومي—native, homebred, one who has never been abroad] of this country, and espoused a daughter of one of them, and of her the Bádsháh Ghiyás-ud-dín Tughluḳ Sháh was born. It is stated in the *Mulhakát* [appendices, additions—the name of a work probably] that the name Tughluḳ originally was Kutlugh, which word is Turkish; and the people of Hind, from usage, inverted it, and have turned Kutlugh into Tughluḳ, and some few have turned Kutlugh into Kutlú." This is all Firishtah says of this so-called "Patan" dynasty.

I shall content myself with one more reference to Dow's translation. It is under the reign of the Afghán ruler whom he styles "Shere", p. 159, vol. 2, and in the paragraph alluded to, that he contradicts his own former statements. He says: "The original name of Shere was Ferid. His father was Hussein, of the Soor tribe of the Afghans of Roh." He then attempts to describe Roh, but blunders even in that:—"The original seat of the Afghans was Roh, which, in their language, signifies a mountainous country. It extended, they say, in length, from Sewad and Bijore, to the town of Sui in the dominions of Buckurast." The original is—"to the town of Siwi, which is a dependency of Bakar." Dow turned the proper name "Bakar" and the verb "*ast*", is, into a proper name. He then continues, "and in breadth, from *Hussein to Kabul*." The original is "from Hasan Abdál to Kábul." The Afghán writers, from the earliest down to Háfiz Rahmat Khán, thus describe the extent and boundaries of Roh; in fact, other writers take their descriptions from *Afghán* accounts, but let it be *particularly noticed* that Ghúr is not contained within the boundaries given. Dow then further states: "This tract, in its fertile vallies, contained many separate tribes. Among the number of these was that of Soor, who derive themselves from the princes of Ghor, whose family held the empire after the extinction of the race of Ghizni. One of the sons of the Ghorian family, whose name was Mahommed Soor, having left his native country,

placed himself among the Afghans of Roh, and was the father of the tribe of *Soor*, who was esteemed the noblest among them."

Firishtah's account is vastly different. He says: "The name of Sher Sháh was Faríd, and his father's name Hasan, who is (*sic*) of the people of the Afgháns of Roh. When Sultán Buhlúl Lúdí attained dominion, the father of Hasan, the Súr, who was named Ibráhím, having evinced a desire of obtaining service, came to Dihlí." He then describes Roh, as mentioned above, and adds: "The Afgháns there are of several tribes, among which is the clan of Súr. They account themselves of the posterity of the Sultáns of Ghúr, and say that one of their sons [a son of one of that family] who was called Muhammad Súr [not Muhammad Súr, but *son* of Súr], in former days, having been made an exile from his native country,—[If the Afgháns were Ghúris, or the Ghúris Afgháns, as it is pretended, and dwelt in Ghúr, how could this person be an exile from his country among his own people, in his own country?—]—came among the Afgháns of Roh, and, as the correctness of his descent was verified to [the satisfaction of] one of the Afghán chiefs, notwithstanding it is not the custom of Afgháns to give their daughters to strangers, that person [chief or head-man] gave his daughter to Muhammad-i-Súr, and made him his son-in-law; and, from him offspring having sprung, they became known as the Súr Afgháns [*lit.* Afghánán-i- Súr], and may be the greater of the tribes of the Afgháns."

This is all Firishtah says on the subject, but he has himself misunderstood or confused the Afghan tradition about this son of a Ghúrí chief, with the other tradition about the Ghúris, related by several authors, which I have referred to in note 7, page 321 of my translation of the *Tabakát-i-Násirí*, which see; and is himself quite wrong in his account of the Afghan tribe of Súr.

The earliest authority known on the descent of the Afgháns, written by Afgháns themselves, is a work, said to have been composed by Shaikh Mali, a distinguished person among the Yúsuf-zí tribe, between 816 H. and 828 H. [Buhlúl Lúdí only came to the throne of Dihlí in 850 H.], and another composed by, or more probably at the command of, Khán Kajú, the celebrated Yúsuf-zí chief of the 100,000 spears "some time after 900 H., nearly half a century before Sher Sháh's obtaining sovereignty, and which two works, written in Pushto, are the basis of the *Tárikh-i-Háfiz Rahmat Khání* and the *Khuláṣat-ul-Ansáb* of Háfiz Rahmat himself, both of which I have translated; and in those works there is no mention of the Ghúrí connection. The other works are: The *Tazkirat-ul-Abrár* of Akhund Darwezah, a Tájik like the Ghúris, not an Afghán; the *Tawárikh-i-Ibráhím Sháhi*; the *Tárikh-i-Nisbat-i-Afāghinah* of Shaikh 'Abd-ur-Razzák Matí-zí, styled also Bilá Pír, son of the great Shaikh Kásim, whose fine mausoleum may still be seen near the walls of Chanár-garh, as that of Ká-

sim Sulaimání; the *Tárikh-i Sher-Sháhi* of Shaikh 'Abbás Sarwání; the *Mir-át-ul-Afághinah* of Khán Jahán Lúdí; the *Makhzan Afghání* of Shaikh Ni'mat-ullah; and the *Ansáb-i-Afághinah* of Faríd ud-dín Ahmad. The last also is silent on the Ghúrí connection.

The tradition (but not contained in *Ferishtah*, who quotes a totally different one, given farther on) on which the whole of the sovereigns of Dihlí, from the Turkish slave Kutb ud-dín of the Powerless Finger—and including his master Mu'izz-ud-dín Muhammad, son of Bahá-ud-dín Sám, since it is because he is considered a "Patan or Afghan," that his Turkish slaves are made "Patans or Afghans" of likewise—down to 'Alá-ud-dín, grandson of Khizr Khán, the last of the *Sayyid* dynasty, are *all* made Patans of, is as follows:—

"In the khiláfat of 'Abd-ul-Malik, son of Marwán [65 H. to 86 H.], Hajjáj, son of Yúsuf us-Šakafí, was appointed to the leadership of an Arab army assembled for the conquest of Khurásán and Ghúristán, i. e. Ghúr; but some of the works previously quoted differ somewhat, and say that Muhammad Hárún was nominated to the command of this army, and also Muhammad Kásim, sister's son of Hajjáj, son of Yúsuf, who was the commander of the forces of Sulaimán, son of 'Abd-ul-Malik, son of Marwán, in the year 86 H. Sultán Bahrám, ruler of Ghúr, who was descended from Zubák, the Táji or Tází, and contemporary with the Khalífah 'Alí, had proceeded to Kúfah, and presented himself before him, and had received from him in writing a grant of the government of Ghúr. [See *Tabakát-i-Násirí*, pp. 312, 315, for another version of this.] This Sultán Bahrám had two sons. The elder was Sultán Jalál-ud-dín Muhammad Husain, from whom is descended, in the third generation, Muhammad-i-Súrí. This seems to point to Muhammad, son of Súrí, mentioned in *Tab. Nás.* p. 319, who was the great great grandfather of the Sultán Mu'izz-ud-dín Ghúrí, son of Sám, the sovereignty over Ghúr being in the elder branch of the family, who overthrew Rái Pithorá and slew him, and who introduced Muhammadanism into Hindústán, and is sometimes called in Hind by the name of Shiháb-ud-dín. [Compare *Tab. Nás.*, pp. 302 to 313, and it will be seen whether this agrees with what the annalist of the Ghúrí Sultáns, and their contemporary Mauláná Fakhr-ud-dín Mubárah Sháh says.] The younger son of Sultán Bahrám was named Jamál-ud-dín Hasan, who had a son, Mu'izz-ud-dín Mahmúd, who again had a son, Sháh Husain by name."

Which one of the elder branch was ruler of Ghúr on the occasion of Arab invasion, is not said, whether son or grandson of Sultán Bahrám; but afterwards it is mentioned that Kamál-ud-dín Mahmúd, son of the eldest son of Bahrám—Jalál-ud-dín—was sent as a hostage to the capital of the Khalífah Walíd.

After stating Muhammad-i-Súrí to be the great great grandfather of Sultán Mu'izz-ud-din of Indian renown, they again proceed to state that, "on the authority of the *Tárikh-i-Khurásán* [some say, *Tárikh-i-Khurásání*], the Sultáns of Ghúr are descended from Zuhák, the Tazí, in this wise. Sultán Bahrám, son of Jalál-ud-dín, son of Sultán Mu'izz-ud-dín, son of Sultán Bahrám, etc., etc." Here the former account seems reversed, and the first Bahrám mentioned would seem to be intended for the so-called *father* of the Sultáns of Ghúr. The writers of this tradition were probably unaware also, that the early rulers of Ghúr were styled Malik, never Sultán and that *the very first* who is styled *Sultán* among the Muhammadan; sovereigns is Mahmúd of Ghazní who was a *Turk*.

"Sháh Mu'izz-ud-dín, father of Sháh Husain [Sháh likewise is neither a title, nor a name occurring among the Ghúrian family], after the subjugation of his country, retired to Makkah, but his son Sháh Husain, separating from his father during these troubles, also left his native country and became an exile. He succeeded in reaching the tents of an Afghán family, which happened to be encamped in the part he first reached, the tribe or chief of which was Shaikh Bataní, or Bah-Taní, or Tabríq, as he is also styled."

Before relating more of this tradition, I must mention that all the Afgháns, *without any exception whatever*, claim descent from 'Abd-ur-Rashíd-i-Kais al-Laik, who was contemporary with Muhammad the Prophet of Islám, who, they affirm, supported the Prophet's cause, and aided him with his arms, and was styled by Muhammad 'Paťán,' signifying the keel of a vessel; and all his descendants are, on this account, called Paťáns, so the Afghán annalists say; and he is said to have died in the 40th year of H., aged 87 years. Shaikh Bataní or Tabríq was his son—one of three, *viz.*, Sarí, Ghari, and Tabríq, who are also respectively styled Sarřaban, Ghar-ghasht, and Bataní or Tabríq. Such being the fact, as related by *all* Afghán writers, the *tribe* could not have been considerable; in fact, at the time in question, it consisted of three families.

"This noble-born youth", as Sháh Husain is styled, "having reached the tents of Shaikh Bataní's tribe (family), was hospitably received and entertained. He appeared exceedingly devout, and by degrees Bataní, a man of piety and austerity, hence styled Shaikh, took a great liking for him, treated him as a son, made him acquainted with all his affairs, and withheld nothing from him. Bataní's sons, Ismá'il, Ishbún (or Ishpún, as he is also called), and Kajín, treated him as a brother; and, as in the hills there is no concealment of females and no prohibition against seeing and meeting them in their family circle, a secret attachment grew up on the part of Sháh Husain towards Matú, Bataní's daughter; and, at last, matters proceeded to such extremities, that Matú was found to be pregnant by

him. Her mother advised Batanī that Matú should be given to Sháh Husain in marriage before this became known. He demurred, as he did not consider the fugitive youth a suitable match for his daughter. The youth affirmed that his ancestors had been princes of Ghúr, and asked him to send some one into that country and verify the truth of his statement. It was done, and Batanī gave his consent; and, shortly after, Bibí Matú brought forth a son, which, being the fruit of an illicit amour was named Ghal-zoe, *ghal* in the Afghán language signifying 'a thief', and *zoe*, 'a son', therefore signifying 'the thief-son', the illicit son. From this son is said to be descended the great tribe of Ghalzī (*zí*, applied to the tribe is plural of *zoe*), numbering, at this period, in all its divisions and subdivisions, near upon half a million of souls, and one of the two most numerous tribes of all the Afghán race.

Another history in my possession, which I have not mentioned above among the others, and the author of which was a member of the *royal tribe*—the Sado-zís, the tribe to which the late Sháh Shujá'-ul-Mulk belonged. He besides quoting his own Afghán authorities, mentions the Tawárikh-i-Saláṭin-i-Lúdiāh wa Súriah-i-Afághinah, and the Risálah-i-Akhhār-i-Khadkah, and gives a detailed account of the early history of the Afgháns. The author styles Matú's father Tabrin only, never by the name of Batanī, and merely mentions that *one of Tabrin's daughters* had a son before the nuptial knot was tied, and adds "*and it is said that there was an illicit connexion between her and Mast 'Alí Ghúrí,*" whoever he may have been, but he does not, in consequence, turn the Ghúris into "Afgháns or Patans". The Ghalzís, on the other hand, deny altogether the truth of this tradition.

Before mentioning anything more respecting Sháh Husain, the "noble-born" Ghúrí youth, and the sons he is said to have been the father of, on the authority of this tradition, I must by the following short table show, from the tradition itself, what relationship existed between the said Sháh Husain, by virtue of whose *traditional* connection with Batanī's, or Tabrin's daughter, Sultán Mu'izz-ud-dín Muhammad, son of Bahá-ud-dín Sâm, the conqueror of Rái Pithorá, and the Ghúrí Sultáns, before and after him, are all turned into Afgháns likewise, and not only they, but their Turkish slaves, and their slaves, and slave's slaves likewise.

Sultán Bahrám.

[contemporary of the Khalífah 'Alí,] descendant of Zuhák, the Tází or Tájí.

1. *Eldes son*, Jalál-ud-dín Muhammad Husain.

2. Kamál-ud-dín Mahmúd, who was sent as hostage to Walid.

3. Son, nameless, [but as *his* son is called Muhammad-i-Súri, it is presumed therefore *by me*, to be Súri], great great-grandfather of the last mentioned under.

4. Son, nameless.

5. Son, nameless.

6. Son, nameless.

7. Mu'izz-ud-dín Muhammad, son of Bahá-ud-dín Sâm, Sultán of Ghaznín, assassinated 602 H.

1. *Youngest son*, Jamál-ud-dín Hasan.

2. Sháh Mu'izz-ud-dín Mahmúd, who retired to Makkah.

3. Sháh Husain [contemporary with Hajjáj, appointed to administer the government of Khurásán, 78 H.], who had *Bibi Matú* to wife.

1, Ghalzi. 2, Ibráhim, surnamed Lúdí, properly *Lo-e-day*, "he is eldest", he being the eldest legitimate son; and 3, Siá-ní.

Now what relationship existed between Sultán Mu'izz-ud-dín Muhammad, son of Bahá-ud-dín Sâm, conqueror of Rái Pithorá, and establisher of the Muhammadan power in Hindústán, whose descent is traced to Zuhák, the Tází, (*i. e.*, *Arab*: by Persian-speaking people Tájí, whence comes the name Tázík and Tájik, by which name the greater number of the *non-Afghán* people of those tracts are still known. See *Tab. Nás.*, page 301) and the descendants of Bibi Matú's sons, whose father, by this tradition, Sháh Husain was? Is there the slightest shadow of a reason why, even if this tradition were true, the rulers of Ghúr, whether Maliks or Sultáns, should be styled, as at page 50, Vol. 1, of Dow's version of *Firishtah*, "Muhammad of the Súr tribe of Afgháns, and in Brigg's version, page 50, Vol. 1, "Muhammad of the Afghán tribe of Súr"? and is there the most remote shadow of a reason why Sultán Mu'izz-ud-dín's Turkish slave should be styled "the founder" of the Afghán or "Patán" dynasty of Dihlí, and all those *Turkish slaves, and descendants of Turkish slaves, the Khalj Turks, and the Sayyids* who trace their descent to Husain, grandson of Muhammad the Prophet, and are acknowledged by all Muhammadans to be his descendants—twenty rulers in all—should be styled the "Patan" or "Pathán" kings of Dihlí?

From the error of calling the Ghúrí Sultáns "*Patans or Afgháns*" emanates another error equally great; but, in this instance, it is the turning of Afgháns into Turks! Wherever the Khalj tribe are referred to throughout *Firishtah's* work, Dow styles them 'Chilligies', which is the name of no people, tribe, or race on the face of the earth, and in this he is followed by Maurice and some others; but Briggs styles them by nearly their correct name, at least, for they are called Khaljí as well as Khalj; but

other writers have at once jumped at the conclusion and some even shortly maintain that they are Ghalzís. For example, Mr. J. C. Marshman, who has written a History of India, "at the request of the University of Calcutta" and who says, "so far as historical truth can be discovered," he is "prepared to vouch for the accuracy of the facts detailed in it," calls them GHILJIES:—(page 53, Vol. 1) "the Afghán mountaineers of Ghuzni and Ghore, denominated the Ghiljies". There is certainly a great similarity between the mode of writing the name of the Afghán tribe of Ghalzí غلزي and the Turkish tribe of Khalj خلیج, Khaljí خلیجی.

What Firishtah does say respecting the descent of the Afgháns, but which is very different from *their* tradition previously given, is this: "When Khálid, the son of 'Abdullah, was removed from the government of Kábul, (other authors of much greater authority than Firishtah relate differently, however) finding it difficult and dangerous to return into 'Irák-î-'Arab through fear of the newly appointed governor, under the guidance of the chiefs of Kábul, he proceeded into the Sulaimán mountains, which lie between Multán and Pesháwar and between many other places, accompanied by his family and a party of Arab followers, and therein took up his residence. He gave one of his daughters in marriage to one of the chief men among the Afgháns there, who had become Musalmáns. From this daughter of the 'Arab, Khálid sprung offspring who multiplied and acquired great repute. One of these was Lúdí, and another Súr; and the Afgháns come from that party of 'Arabs above mentioned. In a work, entitled Matla'-ul-Anwár, composed by one among the trustworthy, which Firishtah perused at Burhánpúr in Khándesh, it was written that the Afgháns are Kibṭiah (Copts)", &c., &c., and there occur other statements foreign to this subject.

The same writer also makes a statement with respect to the Lúdí tribe, Vol. 1, p. 69 which is equally as incorrect as the preceding, and would cause some astonishment, as well as ridicule, among the people referred to. He says:—Belcli was an Afghan of the tribe of Lodi, now known as the Lohani, which is engaged chiefly in the conveyance of merchandise between Hindustan and Persia." Nothing of the sort. Súr, son of Ismá'il, who was the progenitor of the tribe of that name, had two brothers, each the progenitors of separate tribes, one of whom was named Núh, and he is the progenitor of the tribe of Núhání, which name has been corrupted into Lúhání. These are the people who act as the great carriers of merchandise in Central Asia.

Elphinstone in his History correctly states that the Kháljís were a Turkish tribe, long connected with the Afgháns, as Firishtah himself mentions, and does not confound them with the Afghanistan of Ghazni, of whom he gives a good account in his "Caubul."

The 'Masálik ul-Mamálik' states that "the Khalj are a tribe of Turks, which in former days—this work was written long before the time of Mahmúd of Ghazní—settled in Garmsir, between Sijistán and the region of Hind. They are in appearance and dress like Turks, and observe the customs of that race, and all speak the Turkí language." The same work also states in two or three places, that there is a town called Khalj in that part; and in the account of Jáj, also Cháj, of Máwar-án-Nahr says that it is a populous and flourishing city, the people of which are Ghuzz and Khalj, all Musalmáns of the sect of Ghází.

The Ghalzís, so called after the illicit son of the tradition of Bibí Matú and Sháh Husain, have no tribe, subdivision, or family among them styled either "Lodí" or "Súr"; but two other sons were born to Bibí Matú, one of whom was named Ibráhim, who is surnamed Lo-e-daey, signifying in the Afghán language "(he) is great or elder", respecting which name a tradition is attached which need not be related here. It has been corrupted or rather shortened, into Lodí and Lúdí, and Ibráhim is the progenitor of the Lúdí tribe. From him sprung two sons, one of whom, named Siání, had two sons, Pránkí and Ismá'il. Pránkí is the ancestor, eight generations back, of Buhlúl, of the Sháhú Khel, a clan of the Lúdí tribe, who, according to the authors I have been quoting, and as all educated Afgháns themselves will affirm, was the first of the race of 'Abd-ur-Rashíd Paṭán that attained sovereign power. He is the founder of the Lúdíah dynasty, but the thirtieth ruler of Dihlí, counting from Kuṭb-ud-dín, the Turkish slave of the Tájik Sultán Mu'izz-ud-dín Muhammad, son of Bahá-ud-dín Sám Ghúrí.

From Ismá'il, brother of Pránkí and son of Siání, son of Lúdí, sprung two sons, one of whom was named Súr, who had four sons, from one of whom, Yúnas by name, in the ninth generation, descended Farid, afterwards Sher Sháh, who dethroned the second Mughul emperor Humáyún, and was the first of the Súr division of the Lúdí tribe who attained sovereignty; and Ahmad Khán, son of Saidú, afterwards Sultán Sikandar, his kinsman, was the last of the Afghán or Paṭán dynasty. The name Súr appears to have struck those who were in search of a mare's-nest, and they at once jumped at the conclusion, that, as Súrí was the name of one of the Tájik chiefs of Ghúr, and Ghúr lay near the tract then occupied by the Afgháns, the Ghúris must be Afgháns or Paṭáns and the Afgháns Ghúris, and so this error has been handed down from one writer to another up to this present day. Although Firishtah falls into error in supposing Súrí and Súr to be the same name and to refer to the same person, he never turns Ghúris and Turks into Afgháns or Paṭáns.

One example more and I have done. At page 197, Vol. 2, Dow, under the reign of Ibráhim Súr, says: "In the mean time, Muhammad

(sic) of the Afghan family of Ghor, governor of Bengal, rebelled against Muhammad". Here again we have his own ideas inserted, for Firishtah knew better than to utter such an absurdity. That author expresses himself in these words under the reign of Muhammad Sháh, nicknamed Andhlí, 'the intellectually blind'. "At this period, Muhammad Khán Súr, ruler of Bangálah, having raised the standard of hostility," &c. Dow turns the kings of Gujarát and the Bahrí rulers of Ahmadnagar into Patáns likewise. Under the reign of Salím Sháh, he says, (Vol. 2, p. 191) when mentioning his death: "In the same year, Mahmud, the Patan king of Guzerat, [He was the descendant of a Ták Rájpút from near Thánesar] and the Nizám of the Deccan, who was of the same nation, died." Compare Briggs here also. Firishtah's words are these: "In this very same year, Mahmúd Sháh Gujaráti, and Burhán Nizám-ul-Mulk Bahrí, likewise died." This Burhán-ul-Mulk was the son of Ahmad Nizám Sháh, the founder of the Bahrí dynasty and of the city of Ahmadnagar, who was the son of a Bráhmaṇ of Bijánagar who being taken captive in his childhood, was made a Musalmán of, and brought up as one of the slaves of Sultán Ahmad Sháh Bahmaní."

The renowned Afghán chief and poet Khushhál Khán, of the Khaṭak tribe, mentions the two Afghán dynasties in one of his poems. See my 'Poetry of the Afgháns', page 197,—

"The whole of the deeds of the Patáns are better than those of the Mughuls;

But they have no unity among them, and a great pity it is.

The fame of Buhlúl and of Sher Sháh, too, resoundeth in my ears—

Afghán emperors of India who swayed the sceptre effectually and well.

For six or seven generations did they govern so wisely,

That all their people were filled with admiration of them."



*On the Khyeng People of the Sandoway District, Arakan.—By MAJOR
G. E. FRYER, Deputy Commissioner, Sandoway.*

(With two plates.)

PART I.

Physical and Social Characteristics.

Introductory.

The great western mountain range of Burma is peopled by tribes under a great variety of names, of whom the Khyeng race is perhaps the most extensively diffused. The geographical limits of the people are comprised within the 18th and 21st degrees of North latitude. The character of the region inhabited by the Northern Khyengs is described as rugged and inaccessible, and their life a hard one; but the Khyengs here dwell on the fertile banks of streams, and can procure the necessaries of life without difficulty; moreover, though still retaining their individuality, they are gradually adopting the more civilized manners and the mode of agriculture of the Arakanese.

The subjoined statement gives the Khyeng population in the districts of Arakan (Hill Tracts excepted) as it stood at the census of 1872, together with the number of villages and houses:—

Names of Districts.	MALES.			FEMALES.			Total of population.	Number of villages.	Number of houses.	Proportion of column 9 to column 8.	Proportion of column 7 to column 9.
	Over eighteen years.	Under eighteen years.	Total.	Over eighteen years.	Under eighteen years.	Total.					
	1	2	3	4	5	6	7	8	9	10	11
Alkyab,	1,100	943	2,043	970	904	1,874	3,917	40	950	24	4.1
Ramree,	2,791	2,481	5,272	3,014	2,038	5,052	10,324	92	2,260	12	4.1
Sandoway, ...	1,396	1,106	2,502	1,317	896	2,213	4,715	96	996	10	4.7
Total, ...	5,287	4,530	9,817	5,301	3,838	9,139	18,956	228	4,206	14	4.5

Physical Characteristics.

Table A. exhibits the age, weight, height, and measurement in length and circumference of the limbs of twenty-five male and twenty-five female Khyengs of *average* size. The weights are expressed in pounds avoirdupois; the measurements in English inches and tenths. Four pounds, the weight

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of her clothing and ornaments, have been deducted from each woman's
weight.

TABLE A.
*Showing the Age, Weight, Height, and Measurements of the Limbs of twenty-five Male and twenty-five Female
Khyengs of average size.*

	Age.	Weight.	Height.	From crown to se- venth cervical vertebra.	From seventh cervi- cal vertebra to sacrum.	From sacrum to sole.	Length of sternum.	Length of scapula.	Breadth of scapula.	LENGTH IN INCHES.						CIRCUMFERENCE IN INCHES.						Proportion of the sum of columns 4 & 5 to column 3.
										Arm.		Leg.		Head.	Neck.	Chest.	Arm.	Pelvis.	Thigh.	Calf.		
										Shoulder to elbow.	Elbow to wrist.	Hip to knee.	Knee to sole.									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
Males,	36	110	65.2	9.1	22.2	33.9	6.2	6.2	3.6	12.5	10.1	16.7	19.3	21.0	13.0	33.0	9.7	29.0	18.5	12.5	.48	
Females,	29	94	57.4	8.7	20.8	27.9	5.9	6.0	3.0	11.5	9.6	15.8	17.9	20.4	10.6	30.6	8.7	29.8	17.3	11.5	.51	

In Table B. are given measurements of the head of the same persons in English inches and tenths taken by calipers.

TABLE B.

Head Measurements of the same Persons in English Inches and Tenths taken by Calipers.

	Superorbital angle.	MEASUREMENT IN INCHES BY CALIPERS.								Proportion of column 7 in males & column 6 in females to column 2.	Proportion of column 5 to column 2.
		Individuality to occipital spine.	Occipital spine to ear.	Ear to individuality.	Ear to firmness.	Destructiveness to destructiveness.	Cautiousness to cautiousness.	Ideality to ideality.	Zygomatic or facial breadth.		
	1	2	3	4	5	6	7	8	9	10	11
Males,	26°	7.5	4.3	4.7	5.8	5.4	5.5	3.9	5.3	.74	.73
Females,	23°	6.8	4.1	4.6	5.6	5.2	5.0	3.6	5.2	.76	.82

Column 1 expresses in degrees the angle indicating the relation of the ear to the eyebrow. This angle is formed by a line parallel to the base of the brain with another line from the earhole to the superorbital ridge.

Column 2 shows the long diameter of the head, the measurement being taken from immediately above the top of the nose to the small bony projection at the back part of the head.

Column 5 indicates the height of head measured from the earhole to about the centre of crown.

Column 6 gives the breadth from immediately above the external opening of the ear.

Column 7, the breadth from centre of parietal bones.

Column 8, the breadth immediately above the temples.

Column 9, the interzygomatic or facial breadth.

In the male the greatest breadth of head is the parietal. The female head is broadest just over the ear. As might be expected, there is no great breadth of forehead over the temples in either sex.

Considering how strongly brachy-cephalic* the Burman head is, the dolichocephalism of the Khyeng head form, as shown here, is curious. In proportion to its length, the female head is both broader and higher than the head of the male.

The prevailing complexion of the people corresponds with No. 28, and the colour of the eyes with No. 1, of Broca's *tableau*. The colour of the hair is black, but among the women patches of reddish brown hair occur sometimes, generally at the crown of the head.

Individual and Family Life.

Customs.—Under this head are included the usages observed at births, marriages, and deaths.

As regards the first, child-bearing is always assisted and by women. Deaths from child-birth are very rare. Labour is easy and seldom protracted, the woman generally goes to her work the following day. The infant is washed in clear rice water.

Boy's names are monosyllabic, but the girls have the particle *pa* or *ma* prefixed to theirs. The names are given either from a fanciful resemblance to some object, or with reference to circumstances occurring at the time of birth; thus, if at the time of birth there occurred a great flood, a boy would be named *Hlém*, and a girl *Pahlém*, signifying "great." A child is weaned between the ages of eighteen months or two years. Puberty takes place between the ages of twelve and fifteen, at which period the disfiguring operation of tattooing the girl's face is usually performed.

As regards marriage. When a young man wishes to court a girl, he visits her by appointment at night in her parents' dwelling, taking with him some trifling present; if subsequently approved by the parents, he lives in the house. After some months, and indeed if poor, after the birth of one or two children, the ceremony of taking the girl to his house takes place amid much feasting and dancing. On reaching her new home, the priest performs the ceremony of introducing her to the protection of her husband's household god by winding a thread seven times round the girl's right arm, and invoking numberless blessings upon her.

When a person falls sick, one or two priests are sent for and consulted; sometimes they merely state their opinion as to what spirit has seized the sufferer and a propitiatory offering suitable to such spirit is made; at other times they inquire what the sufferer dreamed of the night previous; if an elemental god or other high object of adoration, such as a Burmese pagoda,

* The terms brachy-cephalic and dolicho-cephalic are employed in this sense, *viz.*, where the breadth is to the length in the proportion of .80, or more, to 1.00, the head is placed in the brachy-cephalic category, where it is below that proportion, or less than .80 to 1.00, in the dolicho-cephalic.

has been the subject of the dream, a buffalo or hog would be sacrificed ; but if, as is commonly the case, the invalid had dreamt of an ordinary occurrence, such as crossing the creek in a boat, the sacrifice of a dog would be ordered, in which case a raft composed of stems of the plantain tree would be constructed, and a dog killed and placed thereon with a small quantity of rice-beer. The raft is then pushed into the stream, every one present pelting it with stones ; care is taken, however, that the dog is subsequently brought back to form materials for a repast.

When death occurs in a family, the corpse is laid out in the house, a pig or other animal is killed, and great and prolonged feasting goes on. The day after the event, a dead fowl is tied to one of the big toes of the deceased, and an attendant priest thus apostrophizes the corpse—"Oh spirit ! thou hast a long and wearisome journey before thee, so a hog has been killed upon whose spirit thou mayest ride, and the spirit of this dead fowl will so terrify the worm guarding the portals of paradise, that thou wilt find an easy entrance." The corpse, followed by the relatives and friends of the deceased, is carried to the outskirts of the village and burnt. All wait until the burning is over ; water is sprinkled on the ashes and bones of the skull, hands, and feet ; about nine or ten in number, having been selected, are carried back to the village in a vessel and deposited in the shed erected for the feasting. After seven days have elapsed, more feasting takes place, and the bones are then finally conveyed for burial to some distant mountain, which is the ideal place of interment of the ashes of their ancestors. In cases of violent death, as for example by drowning, or from the attack of a wild beast, the corpse and all the relatives of the deceased are tabooed by the community until a buffalo or hog has been handed over to the headman for sacrifice and feasting ; even then the body may not be taken into a house, nor is a dead fowl attached to the corpse.

On all occasions of marriages, deaths, and domestic entertainment, the company is divided into what are termed inside and outside feasters, in other words into hosts and guests ; for example, at the entertainment after cremation the bones in a vessel are placed at one end of the shed surrounded by pieces of pork and other greasy-looking dainties ; next are seated two priests, in front of whom is placed a pot of rice-beer, which has a cover perforated with three holes, one in the centre to admit of a slender piece of bamboo being placed upright, and one on each side to receive a reed passing into the beer. When a feast is held in a house, the reed towards the sleeping chamber is the inside reed through which the host and his relatives imbibe the beverage ; out-of-doors the inside is that on which the host and his people are sitting. After sucking, each person replenishes the vessel with water in proportion to the quantity of beer supposed to have been taken out.

Pork is regarded the choicest food, and when the husband brings his wife into her new home, he provides that food for her and her family, while he and his relations eat fowls. At funeral repasts the relatives of the deceased eat pork, and the guests have fowl provided for them. These points of etiquette are scrupulously observed, and breaches of them subject the offender to fine.

Laws.—The average number of houses in a Khyeng village is fourteen, and in each of these little communities there is a head called *Tayi* or *Nandayi*. The office passes from father to any son he considers best qualified for it; in default of such a successor, the office may be held by the father's brothers; but it never passes out of the family; when extinct, the village has to join another community. The *Nandayi* presides at all festivals, settles disputes, and acts as a priest in conjunction with the elders of the village. There is another person, however, who ranks higher than the individual just named, he is the *Dek mo tayi*, i. e. land-proprietor's *tayi*. Tradition says these men formerly received grants of land from the kings of Arakan, and were invested with supreme authority over all offenders within the limits of their respective grants; they received a share in the produce of the soil, and enjoyed the taxes levied upon all tabooed persons. Though no longer enjoying these rights and privileges, they are held in much respect. Marriage is a contract dissoluble at the will of either party: no dowry is given. On the death of the parents, two-thirds of the property pass to the eldest son, the remainder is divided among the other sons; women are deemed incapable of holding or transmitting property. Adoption is considered proper, even if there be children by marriage. If a husband take an adulterer in the act, he claims a gong and buffalo from him; he may also chastise his wife, but she is not divorced. Nor will a Khyeng divorce his wife if she is barren; those that can afford it, sometimes under such circumstances, take a second wife. When a dispute has been settled, the reconciliation is effected in the following manner:—the parties and their witnesses assemble before the elders, and a cup of water is placed before them into which a spear, dagger, or celt, has been dipped, the disputants each take a sip of the water and agree to pay a fine if they continue the quarrel. Trial by water ordeal is practised; the person who keeps his head longest under water is adjudged innocent. The principal parties may either perform the ordeal themselves or hire persons to do so.

Religious Rites and Ceremonies.—The religion of the Khyengs confines itself almost exclusively to the propitiation of spirits by offerings and sacrifices. Their prayers consist of lengthy invocations of protection for themselves and property, and propitiatory prayers to ward off sickness or other calamity. The elders of the communities act as priests, and direct and conduct all festivals and acts of worship. On these occasions, hogs, buffa-

loes, dogs, and fowls, are sacrificed, and immense quantities of rice-beer consumed. The three principal festivals are *Nando*, *Plaung-hio*, and *Konde*.

The *Nando* takes place in March or April, in front of the *Nanday's* house who conducts it. Every one in the village contributes towards it. A hog, dog, two fowls, and three large pots of rice-beer are offered, and invocations for a favourable season and other blessings are mumbled by the priests to the spirits of the village.

The *Plaung-hio* is a festival in honor of Jupiter Pluvius, and should by rights be held annually just before the rains set in, but owing it is said to the expense attending it, it is only celebrated about once in every eight or ten years. At this feast buffaloes are sacrificed, oblong stones two or three feet long and five or six inches in diameter, procured from the creeks, are set up vertically at the lower end of the village, in number equal to the buffaloes to be sacrificed. The animals are killed and their blood is poured over the stone. Any sufferer from sickness who can afford it, may offer a sacrifice to this spirit, provided he has first obtained permission from the *Dek mo tayi*. The use of the upright stone is curious, and seems to point to some connection with Phallus worship. Captain Latter already remarked (*Journal, Asiatic Society, Bengal*, 1846), that the Khyoung-thas of the Koladyne river make offerings at stones which "are rough representations of the *Lingum* and the *Yoni*."

The *Konde* is celebrated every year for three years, and after a lapse of three years is again celebrated annually for three years. Its object is to propitiate the *Konde* spirit and his brother and sister, in order to avert sickness and other calamity; at this feast pigs are slaughtered. At the lower end of the village three miniature huts of bamboo are constructed side by side, and a small stone placed in each, together with portions of pork and some rice-beer, prayers are offered, and the proceedings terminate with much feasting.

The above are the principal festivals or sacrifices, but there are many minor spirits to whom worship is paid as circumstances require.

Habitations and Domestic Life.—The houses of the Khyengs are constructed of wooden posts which vary from 9 to 16 in number; the walls and floor are made of bamboo matting, and the roof is composed of grass or leaves. The length of a house varies from 12 to 16 cubits, and it is about 8 to 12 cubits broad; there are two apartments, the sleeping and the cooking, with an open verandah in front of the latter; the flooring is raised some 4 or 5 feet from the ground, and the swine and poultry are enclosed beneath it. (*Vide Plate VII.*) On festive occasions the Khyengs eat hogs, dogs, and fowls, and use abundance of a fermented liquor made from rice, which they call *Yü*. All animals are eaten by them except the tiger, bear, and otter. Their clothes are woven and made at home, and the manufactures, though coarse

are durable and good. Indigo grown by themselves is the chief dye made use of. The male dress is a strip of blue cloth folded round the hips and passed between the legs with an end hanging down before and behind, and by way of head covering a strip of cloth is wound round the head. The women wear a loose blouse reaching to the knee, very open at the bosom and back of the neck, and furnished with slits at the sides for the arms; beneath they wear a short close petticoat. Work in the fields and hill-clearing, together with basket-making, occupy the time of the men. The boys look after the domestic animals. The women are employed in spinning, weaving, and cooking; they also assist the men in the fields. The loom is an effective but very primitive arrangement. The ends of the beam farthest from the weaver, around which the warp is wound, are fastened to two pegs driven in the ground; the weaver seated on the ground has the near beam, round which the warp passes, resting on her lap, the ends of which, together with those of another beam which presses the upper warp threads on the lower, are fastened to the sides of a broad strip of hide against which she leans; transverse pieces of bamboo, turned by the hand, cause the warp-threads to rise and fall as required, and as the threads are opened the shuttle is thrown across; on the reversal of the warp another opening is made, which is similarly crossed by the shuttle.

The Khyengs call themselves *H i o u* or *S h o u*, and state that the *Shindoos*, *Khumis*, and *Lungkhes*, are members of the same race as themselves. They have a tradition that they came down many years ago from the sources of the *Kyendweng* river, but they possess no written record of their descent; they are fond, however, of singing rude ballads, which portray the delights of their ancient country, a specimen of which is here given—

1. *ania la chan don a kho a, e e ẽ e*
2. *htoan ză na baleng a hpŭan a, e e ẽ e*
3. *apõk a poichi a oăt mlü a, e e ẽ e*
4. *htoan ză na baleng a hpŭan a, e e ẽ e*
5. *ané ye olo ve dimo e, e e e*
6. *si sho e lo po e hnaung e, e e ẽ e*
7. *son sho e atoan e ey e, e e ẽ e*
8. *Kanau o suam ei o htuĩ yo, e e e.*

Translation.

1. To the upper (country of the) *Kyendweng* (river),
2. To the level (plains of the) *baleng* and dry *htoan* (grasses),
3. To the brick (walled) city of our forefathers,
4. To the level (plains of the) *baleng* and dry *htoan* (grasses),
5. Which are so charming (*lit.* not a little charming),
6. Let us hie, come along!

7. Let us haste with every speed,
8. Oh my fairy-like young brother!

PART II.

Grammatical Notes on the Language.

As the *Khyeng* or *Hiou* language does not possess a series of letters by which to express elementary sounds, the *Roman* alphabet will be used for that purpose, and so far as it is applicable to this language the admirable system of orthography adopted by Professor James Summers in his *Hand-book of the Chinese Language* will be followed.

The system of orthography adopted.

1. VOWELS, SIMPLE AND COMBINED.

<i>Form</i>	<i>Value of each.</i>	<i>Short value.</i>
<i>i</i>	<i>ī</i> as <i>i</i> in <i>police</i> .	<i>bīt</i> .
<i>e</i>	<i>ē</i> as <i>a</i> in <i>fame</i> ; <i>ä</i> in <i>fähig</i> (Germ.); <i>é</i> in <i>méme</i> (Fr.)	<i>bēt</i> .
<i>a</i>	<i>ā</i> as <i>a</i> in <i>father</i> .	<i>bāt</i> .
<i>α</i>	<i>α</i> as <i>a</i> in <i>organ</i> .	<i>būt</i> .
<i>o</i>	<i>ō</i> as <i>o</i> in <i>no</i> .	<i>nōt</i> *
<i>ö</i>	as <i>ö</i> in <i>Löwe</i> (Germ.); or <i>œu</i> in <i>sœur</i> (Fr.)	
<i>u</i>	<i>ū</i> as <i>u</i> in <i>rule</i> .	<i>būll</i> .
<i>ü</i>	<i>u</i> as <i>u</i> in <i>lune</i> (Fr.); <i>ü</i> in <i>Mühe</i> (Germ.)	<i>eu</i> in <i>peutêtre</i> (Fr.)
<i>ie</i>	<i>iē</i> as <i>ie</i> in <i>pied</i> (Fr.); <i>yea</i> (Eng.)	<i>yē</i> in <i>yesterday</i> .
<i>ia</i>	<i>iā</i> as <i>ia</i> in <i>lia</i> , <i>plia</i> (Fr.); <i>ja</i> (Germ.)	<i>yā</i> in <i>Yankee</i> .
<i>io</i>	<i>iō</i> as <i>io</i> in <i>million</i> (Fr.).	<i>yā</i> in <i>yacht</i> .
<i>iu</i>	<i>iū</i> as <i>ew</i> in <i>hew</i> , <i>yew</i> .	<i>jū</i> in <i>juchhe</i> (Germ.)
<i>ei</i>	as <i>ei</i> in <i>sein</i> (Germ.); <i>ie</i> in <i>pie</i> (Eng.), or <i>ei</i> in <i>height</i> .	
<i>ai</i>	as <i>ai</i> in <i>aisle</i> .	
<i>au</i>	as <i>ow</i> in <i>cow</i> .	
<i>oi</i>	as <i>oi</i> in <i>voice</i> .	
<i>ui</i>	as <i>ui</i> in <i>ruin</i> .	

2. THE CONSONANTS, SINGLE AND COMBINED.

<i>b</i>	as in <i>English</i> .
<i>ch</i>	as <i>ch</i> in <i>hatch</i> .
<i>d</i>	as in <i>English</i> ; <i>ḍ</i> pronounced by bending the tongue as far back as possible.
<i>g</i>	as <i>g</i> in <i>good</i> ; never <i>g</i> as in <i>gin</i> .
<i>h</i>	as <i>h</i> in <i>heart</i> ; before <i>i</i> and <i>ü</i> a strong aspirate, nearly <i>sh</i> .
<i>k</i>	as <i>k</i> in <i>king</i> .

<i>l</i> as <i>l</i>	in	<i>line</i> ; <i>ḷ</i> as <i>lr</i> in	<i>wheelrim</i> .
<i>m</i> as <i>m</i>	in	<i>mine</i> .	
<i>n</i> as <i>n</i>	in	<i>nine</i> ; <i>ng</i> as in	<i>anger</i> .
<i>p</i> as <i>p</i>	in	<i>pine</i> .	
<i>r</i> as <i>r</i>	in	<i>run</i> .	
<i>s</i> as <i>s</i>	in	<i>see</i> .	
<i>sh</i> as <i>sh</i>	in	<i>shine</i> .	
<i>t</i> as <i>t</i>	in	<i>tiny</i> .	
<i>w</i> as <i>w</i>	in	<i>way</i> .	
<i>y</i> as <i>y</i>	in	<i>you</i> .	
<i>z</i> as <i>z</i>	in	<i>English</i> .	

Adopting Mr. Beames' system of classification, the Khyeng language belongs to the Lohitic or Burmese class of the Turanian family. Its structure is monosyllabic, consisting of roots or stem words which undergo no change except for the purposes of euphony. As the affirmatives are for the most part words which have lost the power of separate existence, the language is in the agglutinated stage. It is very simple in construction and expression, but elaborate in its tones.

One or two of the most marked ones are here indicated :

The *acute accent* over a letter or syllable indicates a rising tone of the voice as when raised at the end of a question.

The *grave accent* over a letter or syllable indicates a falling tone of the voice.

The horizontal stroke above letters indicate an emphatic stress to be laid on the pronunciation of the syllable over which it appears.

Final consonants are often mute, they are formed in the mouth but not always pronounced unless a vowel follows. In this sketch final consonants in italics should not be sounded.

ON NOUNS.

Khyeng words of this class may be divided into :—

1. *Nouns Primitive*, i. e. such as are monosyllables bearing their primitive signification.
2. *Nouns Derivative*, i. e. such as are formed by the addition of some formative syllable.
3. *Nouns Composite*, i. e. such as are formed by the union of two different roots.

Primitive Nouns or those which are monosyllabic, are such as the following :—

<i>ā</i>	<i>a fowl.</i>	<i>pom</i>	<i>a forest.</i>
<i>blüm</i>	<i>a hill.</i>	<i>htěn</i>	<i>a tree.</i>
<i>dek</i>	<i>the earth.</i>	<i>tui</i>	<i>water.</i>
<i>kiau</i>	<i>a mountain.</i>	<i>ui</i>	<i>a dog.</i>

There are, however, few stem-words which are strictly monosyllabic. Most of them take adjuncts either as prefixes or suffixes, or both, which Mr. Hodgson has termed 'differential servile particles', and no doubt, as he justly remarks, "the basis of these languages is a small number of monosyllabic roots bearing necessarily many senses; hence to distinguish between those several senses is the chief function of the servile adjuncts of the roots."* Many of these serviles are inseparable, as for example 'kə' and 'kh' in *kəhni the sun*, and *khlo the moon*; others again are scissile in composition, as for example the prefix *mə* and suffix *ht* of *məkuht, the hand*, in 'kie ku nü', *my thumb*.

Derivative nouns are such as are derived from verbal roots, whether living or obsolete, and which acquire the form of substantives by the addition of a formative prefix such as *a* or *mə*; *e. g.*,

<i>aak</i>	<i>a fragment</i>	from	<i>ak</i>	<i>to break.</i>
<i>amlak</i>	<i>a loving</i>	from	<i>mlak</i>	<i>to love (obsolete).</i>
<i>məhau</i>	<i>a speaking</i>	from	<i>hau</i>	<i>to speak.</i>

Composite nouns are such as are compounded of two roots, the first of which may be said to stand in the genitive case. The members of the compound may either be two nouns, or two verbs, or a verb and noun combined; *e. g.*,

<i>on duəm</i>	lit. <i>remaining place,</i>	<i>a seat.</i>
<i>ik duəm</i>	lit. <i>sleeping place,</i>	<i>a bed.</i>
<i>kho mik</i>	lit. <i>foot's eye,</i>	<i>the ankle.</i>
<i>nəgo han</i>	lit. <i>dragon's yawning,</i>	<i>a rainbow.</i>
<i>məhau kho</i>	lit. <i>speaking aperture</i>	<i>the mouth.</i>

Diminutives are formed by affixing 'so', signifying *little*, to words, as *khlaung so, a lad*.

The distinctions of number and gender are made in a similar way by affixes.

OF NUMBER.

There are three numbers, the singular, dual, and plural. The noun or pronoun by itself indicates the singular. The dual is expressed by the particle 'hoi', signifying *a pair* or *couple*. The plural is expressed by the following particles all signifying *many*, *hio*, *loi*, *tak*, *nü*. Thus, when the subject of conversation is understood, a Khyeng would say 'nəhoi sit u', *the two are going*, or without using the pronoun 'sit u hoi'; but a Burman, having no dual, would under similar circumstances commit the solecism *the two are going* all.

* Hodgson's 'Mongolian Affinities of the Caucasians' in Jour. As. Soc. Beng., 1853, note to page 36.

OF GENDER.

Gender is marked by affixes indicating sex; thus, *pāhto male*, and *nāhto female*, are affixed to *khlaung man*, to express the gender.

The general female affix is 'nū', signifying *fecundity*, as *ā nū a hen*.

The male affix for birds, and also occasionally for fish, is 'hluī', as *ā hluī a cock*.

The male affix for quadrupeds and reptiles seems to be 'htsa', as *kie htsa a tiger*; *hpo htsa a snake (male)*.

The male affix for the dog kind is 'han', as *ui han a dog (male)*.

The following are forms derived from the Burmese, *e. g.* *wok-hpa a hog*; *non hti a buffalo (male)*; *mui bo an elephant (male)*.

OF CASE.

Those relations of words to each other which in inflected languages are termed *Cases*, are exhibited by the following particles affixed to the noun or pronoun—

ku or gu *of*, the *genitive* particle.

a *to or for*, the *dative* particle.

āgu *from*, the *ablative* particle.

The genitive particle is more frequently understood than expressed; the Case is then indicated by the juxtaposition of the two substantives, the former being understood to be in the genitive case.

ON PRONOUNS.

Personal Pronouns. The personal pronouns have two forms, (a) a separate, full; and (b) a contracted form.* In their contracted state they blend themselves alike with nouns and verbs.

The nominative case of each personal pronoun in its full and contracted forms is here given in the three numbers :

SINGULAR.		DUAL.		PLURAL.	
Full.	Contracted.	Full.	Contracted.	Full.	Contracted.
1st <i>kie I</i>	<i>kā</i>	<i>kie hni We two</i>	<i>mā</i>	<i>kie me We</i>	<i>mā</i>
2nd <i>naun Thou</i>	<i>nā</i>	<i>naun hni Ye two</i>	<i>mā</i>	<i>naun me Ye</i>	<i>mā</i>
3rd <i>ayat He</i>	<i>or</i>	<i>ayat hni They two</i>	<i>or</i>	<i>ayatti</i>	<i>or</i>
<i>or She</i>		<i>or</i>		<i>or</i>	
<i>ya or It.</i>	<i>namā</i>	<i>ya nhi They two</i>	<i>nā hoi</i>	<i>yati</i>	<i>nā hio</i>

* "Rosen states that the Circassian pronouns have two forms, a complete and separable one, and an incomplete and inseparable one." Hodgson on the Mongolian Affinities of the Caucasians. (Journ., Beng. As. Soc., 1853.)

When the sense is complete without it, the full form of the personal pronouns is often omitted.

The contracted form of the second and third persons is more frequently understood than expressed, as—*pón a ón ù hói (they) two dwell in a forest.*

The contracted form of the third personal is often used as a nominative affix thus, *anū nā apo nā nāso yok hmu ăgù kát ù hói, the parents wept on seeing their child's corpse.*

Demonstrative pronouns are the following :—

SINGULAR.		DUAL.		PLURAL.	
ni	<i>This</i>	ni hói	<i>These two.</i>	ni hio	<i>These</i>
to	} <i>That</i>	to	} hói <i>Those two.</i>	to	} hio <i>Those</i>
toni		toni		toni	

Ni *this*, and to or tōni *that*, with the *dative* affix, become 'ni a' *here*, and 'to a' *there*; with the *ablative* particle ăgu, *hence* and *thence*. The more distant *there* is expressed by 'sōwa' or 'sōbra'.

Relative Pronouns. Of these there are none in the language. The idea of relation is periphrastically expressed by a verbal root with the genitive particle affixed coupled with the object; thus *the man who runs* would be 'son gu khlaung', *the running man*.

Interrogative Pronouns. These are 'ani' *who*, 'ani ku' *whose*, 'baung' and 'pi', *which, what*.

ON ADJECTIVES.

Adjectives are usually placed after the nouns they qualify. They do not alter their terminations to express either number, case, or gender; indeed, many words have a substantive, adjective, or verbal, signification according to their position in the sentence.

The *Comparative* degree is formed by the word 'san', *great*, placed before the adjective, thus—*ahpói good, san ahpói better.*

The word 'lou' *more* is used synonymously with the English word *than*; thus, *tōni lon a ni hboi moi u, this is better than that.*

The *Superlative* degree is expressed by the word 'hōk' *very, much*; thus, *alhém hēk kuām pihio moi u? how old is the eldest?*

OF NUMERALS.

The following is the cardinal series of numbers adopted by the Khyengs :—

1	hot	20	goi
2	hni	21	goi ne pumhot
3	htum	30	htum gip
4	mli	31	htum gip pumhot
5	hngo	40	mli gip
6	sop	41	mli gip pumhot
7	she	100	pia hot
8	shāp	101	pia lon ne pumhot
9	go	121	pia goi ne pumhot
10	ha or hnga	1000	pia hnga.
11	ha ne pumhot	1001	pia hnga lon ne pumhot
12	ha ne puhni		

The numerals 2, 3, 4, 5, 6, 8, 9, are borrowed from the Burmese; 'goi' *twenty* is evidently a corruption of the Chittagong 'kuri'; goi ne pumhot is *twenty with one*; htum gip, *thirty*; mli gip *forty*, up to *ninety*, signify *three claps*, *four claps of the hand*, the word 'gip' being a corruption of the Burmese word 'akhyet', *a stroke or blow*; pia lon ne pumhot is *one hundred more with one*.

The same peculiarity in the use of numerals which characterizes the Burmese and other Turanian tongues, exists in a modified form in Khyeng. When applied to mankind, the exponent particle 'pum' *a body or thing* is usually prefixed, as 'khlaung pun htum' *three men*; and in reckoning of a group of individuals or things, the computation proceeds thus 'pumhot,' 'pun hni', 'pun htum', 'pum mli' &c. When the numerals are applied to individuals of the brute creation, they are preceded by 'zum' for *quadrupeds*, and 'hték' for *fish*, each signifying *a brute animal*; and 'yum' *a creeper* for reptiles. But these particles are rarely used.*

ON VERBS.

Most verbs in Khyeng are formed from the abstract root by the addition of certain prefixes and affixes.

In the Indicative mood the verb is in its simplest state, unconnected with any other to modify its operation.

There are three tenses, the *Present*, *Past*, and *Future*; the affixes to denote these are for the Present 'u'; the Past 'niu', or more commonly with the auxiliary 'bri', as 'bri niu'; the Future 'el', which perhaps may be a contraction of the root 'woi' *to wish*.

The affirmative verb usually takes as a prefix the contracted form of the pronoun.

* Professor Summers styles them 'exponent particles', which appears a more appropriate term than 'numeral generic affix.'

The letter *n* frequently precedes verbal roots whose initial letters are *k, g, t, d, ch, z*; and the letter *m* those roots which commence with *p* or *b*.

Roots ending in 'auk' sometimes for the sake of euphony change the 'auk' into 'o', as—'kie ka klauk u' *I am falling*; 'ayat klo u' *he is falling*.

The following will serve as a model for the variations a Khyeng verb undergoes.

'Pek', to give.

Indicative Mood.

PRESENT TENSE.

Singular.

- | | | |
|----|--------------|--------------|
| 1. | kie kapek u | I give. |
| 2. | naun napek u | Thou givest. |
| 3. | ayat napek u | He gives. |

Dual.

- | | | |
|----|------------------|------------------|
| 1. | kie hni mapek u | We two give. |
| 2. | naun hni mapek u | } Ye two give. |
| | nahoi napek u | |
| 3. | ayat hni mapek u | } They two give. |
| | nahoi napek u | |

Plural.

- | | | |
|----|------------------|--------------|
| 1. | kie me mapek u | We give. |
| 2. | naun me mapek u | } Ye give. |
| | nahio napek u | |
| 3. | ayati mapek u | } They give. |
| | yati hio napek u | |

PAST TENSE.

Singular.

- | | | |
|----|----------------|--------------|
| 1. | kie kapek niu | I gave. |
| 2. | naun napek niu | Thou gavest. |
| 3. | ayat napek niu | He gave. |

In the same manner through the dual and plural numbers.

FUTURE TENSE.

Singular.

- | | | |
|----|---------------|------------------|
| 1. | kie kapek ei | I shall give. |
| 2. | naun napek ei | Thou shalt give. |
| 3. | ayat napek ei | He shall give. |

And so on through the dual and plural numbers.

The *participial* form is denoted by the genitive and dative particles being affixed to the root, as—'son gu khlaung' *the running man*; 'to hmu ägu kät ù hói' *having seen that both wept*.

As in most other uninflected languages, the *Imperative* mood is confined to the second person. It is indicated by the particle 'e' affixed to the root, thus 'pek e' *give thou*; 'sit e' *go thou*.

The *Infinitive* mood, as in Burmese, is generally expressed by the future tense, thus—'kie ayat a sit ei ka hau niu' *I told him to go*.

There are certain roots which are constantly used as *auxiliaries*. They assist in forming the various parts of the verb with which they are conjoined. Nearly all of them are roots which have lost the power of a separate existence.

The most common of these auxiliaries are—

First. Those which *perfect* the notion of the primitive—

- (a) bri (to finish)
tua zei bri niu, *the work is now finished*.
- (b) mak (to complete)
ui naē mak niu, *the dog ate it up*.

Secondly. Those which denote *power, obligation, &c.*

- (a) kho (to be able, can)
kie kasit kho u *I can go*.
- (b) hpa (lawful, right)
sit hpa u (you) *should go* (lit., it is proper to go)
- (c) la (to get, obtain)
boyó pihio mbek lei mó *how much shall (I) give (you) Sir?*

Thirdly. Those which denote *desire, effort, risk, &c.*

- (a) woī (to wish)
kie kasit woī u *I want to go*.
- (b) sok (to try)
pliso kie ka ik sok u *I will try and sleep a little*.
- (c) dat (to dare)
naun nasit dat u mo *will you dare to go?*
- (d) bo (to return)
hōt á lo bo e *come again to-morrow*.

There are two auxiliary roots whose application is not fully understood. They are 'ey' and 'nauk' (in composition the latter is frequently changed into 'no'). One of their functions would seem to be to give a verbal signification to words borrowed from the Burmese or other language. Their use will be best illustrated by examples.

- sit nauk u *he goes courting*.
- kie kamlak nauk u *I love*.
- to nāhto zo kói no u *that little girl is pretty*.
- sit ei nashang ey u (you) *ought to go* (lit. to go is proper.)
- non ē a kasit ey u (I) *go to buffalo eating (feast)*.

Here 'kói' and 'shang' are evidently corruptions of the Burmese words 'kyo' and 'htěn'.

The root 'ey' affixed to the root 'sun' (to bear, suffer) helps to form the passive voice, thus 'kie tuk ka sun ey u' *I am killed*; 'kie deng kasun ey u' *I am beaten*, but it is rarely used.

There appear to be only three substantive verbs, namely, 'moi' to be, exist; 'shi' to be true; and 'ti' to be, thus:

kie nam zam kamoi u, *I am the village elder.*

shi ba, *it is, yes.*

pikha ti u, *what is it?*

The *Interrogative* particle is 'mo', added at the end of a sentence, as,—
'Naun a shami mói ù mō' *have you children?* If there is any other word in the sentence implying interrogation, it is frequently omitted, as 'naun ani ũ' *who are you?*

The *suppositional* particles 'a', 'na', or 'dina', implying *if*, are affixed to the verbal root, which drops the prefixed contracted pronoun, as, 'kie zei kho na kazei ei' *I will do it if I can.*

The *negative* verb does not take the prefixed contracted pronouns. To express simple negation, (1) the letters n, m, or mb, may be prefixed either to the verbal root, to the particles of tense, or to both; (2) the hard initial consonant of a root, such as k, t, p, and s, is changed into its corresponding soft consonant g, d, b, and z; (3) the root often requires the substantive verb as an auxiliary.

shi ba *it is.*

nshi nu *it is not.*

sit hpa u (you) *may go.*

zit hpa mbu (you) *may not go.*

kie kapek u *I give.*

kie mbek shi nu *I am not giving.*

káng ù mó *is he well?*

ngang nu (he) *is not well.*

kie ka klauk u *I am falling.*

kie nglo nu *I am not falling.*

ya kói no ù mó *is she pretty?*

goi no nu (she) *is not pretty.*

Prohibition may be expressed either by the particle 'ăn' or 'n' immediately after the root, as 'sit e' go (thou), 'lo e' come (thou), 'zit ăn e' go (thou) not, 'lo ne' come (thou) not; or by the particle 'ti' immediately after the root and its auxiliaries as—'zit la shi di' (you) must not go; 'hôt a lo ei ti' come not to-morrow.

ADVERBS appear to be used indiscriminately in composition.

The language being poor in *conjunctions*, participles are largely made use of to supply the deficiency.

Post-positive particles are used in the same manner as the prepositions of Western tongues.

The construction of the language is simple and inartificial. In a sentence the nominative usually comes first, the object next, the verb last. The language is remarkable for its three numbers and its system of prefixed pronouns. It is probable that both these peculiarities exist in the Khumi and Kyo, and possibly may be discovered in the other hill tongues of Northern Arakan. In his sketch of the Khumis and Kyos,* Capt. Latter speaks of the exponent particles (termed by him *numeral generic affixes*) as being entirely wanting, though he suspected a better acquaintance with those dialects would reveal them. Colloquially a Khyeng rarely uses them, and as he possesses a dual number, one is at first led to imagine that his language does not possess them; possibly a latent dual together with a like infrequent use of those particles by the Khumis and Kyos may have led Capt. Latter to imagine they were wanting in those languages. Again, he says the Khumis form their future by "the addition of the affix 'nák', which, when the roots end with a mute consonant often has the euphonic vocal 'gă' intervening: 'Kai tchek gă nák' *I go or will go.*" As regards the Kyos, he says,—“Ka is the nominative affix, chiefly used with the noun in construction with a verb in the present tense. In which case the verb dispenses with its own affix of time.” The vocal 'gă' in the one case and the nominative affix 'ka' in the other, seem to indicate the existence of a similar system of prefixed contracted pronouns in those tongues.

A fable well known to Burmese scholars rendered into Khyeng and a series of short sentences are appended in the hope that they will afford an insight into the grammatical structure of the language.

Fable of the two wild dogs and the tiger.

In the olden time, two wild dogs lived in a forest, and after a while had three young ones, a male and two females. Subsequently they quarrelled, and on dividing (their property) each took one of the females. The male which remained, the mother claimed saying, “He is my share, I have borne him about with me, with great suffering, therefore I ought to have him.” The father said, “I being the husband and lord over my wife, ought to have him.” Thus disputing they went to the abode of a tiger (to have their case decided). On arriving there, the tiger said, “So you are come to me, are you!” and having given one of the young ones to the father, and one to the mother, he cut the remaining male down the middle, and gave half to each of them. The parents looking on the dead body of their young one, lamented bitterly and said, “My lord tiger, you have indeed made a division, but not thus cruelly, alas, ought you to have done it!” Then they threw down the dead body of their young one before the tiger, and went their way.

* Journ., As. Soc. Beng., 1846.

In Khyeng.

Yokha, pom ui zun hni pon a on ù hói, kla águ pom ui han zun hot pom ui nũ zun hni átauk ey u ; nàwo nàhau ey nũ ágù, pom ui nũ zun hni pumhot zun hot hpé ey ù hói. Pom ui han zun hot kiuân ágù, anũ nà-kie hólai kà khon u kie dôn kà buan ey ei áshāng ey u ; apo nà-kie kápāyā kà-boi bo kie dôn kàbuan ey ei áshāng ey u. Nàwo nàhau nũ águ ákié tayī on duan a sit ù hói, hpo ágù, ákié tayī nà-kie on duan a nàhpo ú ! to áso zun hni, anũ a pumhôt—apo a pumhôt—pek bri ágù, pom ui han so zun hot kiuân ágù ámlūng a khon u áhpe u. Anũ nà apo nà nàso yok hmu ágù kát ù hói, ákié tayī o ! níkha nàsei ei nshāng ey nu ; nàso yok ákié hmon gon a tong u bo ù hói.

SENTENCES.

English.

Khyeng.

Come here.	ni a lo e.
Sit down.	nàkho on e.
Are you well ?	màkang ba mó ?
I am well.	kàkang ba.
What is the matter ?	pikha ti ũ ?
There is nothing the matter.	pikha ba ndi nu.
What do you want ?	naun baung alũ ey mó ?
I want nothing.	kie baung ba lũ ey nu.
Why have you come ?	khā ti nalo ú ?
The master called.	aboī mawuī u.
Are you hungry ?	bũ ándu ey mó ?
Will you eat cooked rice ?	bũ na ē ei mó ?
Are you thirsty ?	tuī nàhei (or nàha) ey mó ?
Will you drink rice-beer ?	naun yũ nàok ei mó ?
I will try a little.	pleso (<i>pron.</i> pliso) kàok sok ei.
Who are you ?	naun anī ú ?
I am the village elder.	kie nam zām moi u.
Of what race is he ?	ya baung miu ũ ?
He is a Khyeng.	áhiou (or áhiu) miu u.
How does he live ? (what work)	baung baung zeī ũ ?
He plants tobacco and chillies, and	mákhū naling u, hōmăk naling u,
sows cotton and sesamum.	hpoi nàhpo u, áshi nàhpo u.
Do you understand ?	naun nàyauk siē ba mó ?
I do not understand.	kie yu si nu.
When will he come ?	baung khoă lo ei mó ?
He will come now.	tua lo ei.
Where are you going ?	bāān a sit yu ?
I am going to court that girl.	to hon nũ kie kà sit nauk ei.

English:

Khyeng.

How many houses are in your village?

There are twelve houses.

Are all the women's faces tattooed in your village?

They are all tattooed.

What does Pamblaung say?

'I am beautiful', she says.

Is she beautiful?

She is not beautiful.

How old are you?

I am thirty.

How old is your wife?

She is twenty-five.

How many children have you?

I have four, one boy and three girls.

How old is the eldest?

The eldest is seven.

Is the youngest at the breast?

Yes, it is.

Has it cut all its teeth?

Not yet cut.

I am going. Go not.

I cannot come.

I dare not go.

You must not go.

You ought not to go.

Go before he comes.

If you find it, bring it.

If you wish to go, go.

If you pull the cat's tail, she will scratch you.

If you go there, you will be struck.

I will do it, if I can.

I am falling. He is falling.

I am not falling. He is not falling.

I am loving. He is loving.

I am (he is) not loving.

nan ā iām pihio moi ú?

hnga iām nhi moi u.

naun nan ā hnato zei zei ămhaung
mashuan ù mó?

zei zei mashuan u.

Pamblaung baung nahau ey mó.

Pamblaung nā, kie kạ kói nauk u
nauk u.

ya kói no u mó?

gôi no nu.

naun kuam pi hio moi ù mó?

htum gip moi niu.

păya kuam pi hio moi ù mó?

kạpăya gö kuam hngo.

naun ā shami moi ù mó?

pum mri moi u, pato pu'hot, hnato
pun htum,

ahlém hek kuam pihio moi ù mó?

ahlém hêk kuam she.

ămlek hêk sui ok moi ù mó?

ă, moi u.

ăho po mák ù mó?

bo mak hon nu.

kie kạ siŷu. Zit ăn ă.

kie nlo khó đi nu.

kie zit dât shi nu.

zit la shi dĩ.

zit hpa mbũ.

nlo khlaung a sid e.

naun khon đina lo bo e.

sit woi da sit (d, euphonic).

min zam hómé hnũk đinā mẵmplei
èy ăi.

naun sóbra sit ăná ăđeng nẵsuney ăi.

kie zei kho nă, kạ zei ăi.

kie kạ klauku. ăya klo u.

kie ngto nu. ăya ngto u.

kie kẵmlak nauk u. Ya nẵmlak
nauk u.

kie (ăya) nẵmlak no nu.

English.
Khyeng.

I love him.	kie aya kamlak nauk u.
He loves me.	kie namlak nauk u.
I am pointing (with the finger).	kie kachi u.
He is pointing.	aya namanchi u.
What is he pointing at?	aya baung nachi u.
Is the work finished?	nazei pri u mó?
It is not finished.	bri hon nu.
Do you think it will rain?	yo oo ei nachian u mó?
I do not think it will rain.	yo'noo shinu kachian u.
Is the village far?	to nam hló ù mó?
It is near.	aseng u.
Who is coughing?	anku ani ú?
He is coughing (<i>i. e.</i> , has a cough).	yanku shi u.
What did you beat him with?	naun aya baung ung deng u?
I struck him with a stick.	htén bo nung kadeng u.
Those men went with their bows to shoot wild pig.	to khlaung hio ali ung pom wok hot ei sit u hió.

PART III.

A Vocabulary in Khyeng and English.

The vocables in this section of the Vocabulary may perhaps be grouped under the following heads:—

(a.) The *generic* or *cognate*, such as are common to the majority of the hill tongues, as for instance; 'kahni' *the sun*; 'khlo' *the moon*; 'kli' *air*; 'ui' *a dog*.

(b.) The *specific* or, perhaps more correctly, the *dialectic*, such as are peculiar to the Khyeng tongue: as for example; 'blüm' *a hill*; 'dek' *the earth*; 'kiau' *a mountain*.

(c.) The *foreign* or such as are borrowed from other tongues, as for example 'mlu' *a town*, from the Arakanese 'mro'; 'anik' *black*, from the Burmese 'anek'; 'sonai' *lime*, from the Hindústání 'chúná'.

The origin of these latter is indicated by the capital letters A, B, or H, being prefixed to them.

A.

a, *post pos.*, at, among, for, in, to; 2, *suppositional affix*, if; 3, *dative particle*.

ägu, *post pos.*, from, in, *ablative particle*.

ä, *n.*, a fowl; — hlùi, a cock; — hlùi khong u, the cock crows; — nü, a hen.

- ʔak, *v.*, to break ; — so, a bit, fragment.
 ʔbo, *n.*, a mushroom.
 ʔböḵ, *adj.*, white.
 ʔdön, *n.*, a mat ; — hio, *v.*, to roll up a mat.
 ʔhā, *n.*, a yam.
 ʔham, *n.*, an otter.
 ʔhāng, *n.*, a musquito.
 ʔhau, *n.*, speech ; — pek, to abuse ; — yauk, to tell, relate.
 ʔhaung, *n.*, liquid, juice.
 ʔhboi, ʔhpoi, *adj.*, good, handsome.
 ʔhé, *n.*, an axe.
 ʔhē, *n.*, firewood.
 ʔhéng, *adj.*, green, alive.
 ʔhlém, *adj.*, great, large, big.
 ʔhling, *n.*, a thorn.
 ʔhlō, *adj.*, far.
 ʔhlök, *n.*, heat ; — soat, *v.*, to perspire.
 ʔhlüng, *adj.*, high, lofty, tall.
 A. ʔhmaung, *adj.*, painted, ornamented ; — shuam, *v.*, to tattoo.
 ʔhmü, *n.*, a kite (bird).
 ʔhmuat, *n.*, the gall bladder ; with 'mé', to blow the fire.
 B. ʔhmo, *n.*, hair of the body, down ; 2, a feather.
 ʔhni or ʔhné, *n.*, a wild dog.
 ʔhnü, *n.*, the last, the space behind a thing.
 ʔhom, *n.*, a creek.
 ʔhōng, *adj.*, empty, deserted.
 ʔho, *adj.*, dry.
 ʔhtá, *adj.*, new.
 B. ʔhté, *n.*, the fruit of a tree or plant.
 ʔhti, *n.*, blood ; — klong, *n.*, a vein.
 ʔhto, *adj.*, acid, sour.
 ʔhtō, *adj.*, angry.
 ʔhto, *n.*, an arrow.
 ʔhtüi, *adj.*, young, small.
 ʔhtuk, *adj.*, deep as water.
 B. ʔkhō, *adj.*, bitter ; *n.*, an aperture, hole.
 ʔkié, *n.*, a tiger.
 ʔkī, *n.*, a horn, as 'non kī' *buffalo's horn* ; also, an angle, corner.
 A. ʔklam, *n.*, advice, counsel ; 2, enclosure, fence.
 A. ʔklong, *n.*, a line.
 B. ʔko, or ʔgo, *adv.* and *post pos.*, under, beneath.
 B. ʔkoi, *n.*, an ear or spike of grain.

- B. ăkü, *n.*, help, assistance ; 2, a spider.
- A. ălak, *n.*, liquor, spirit, *arrack*.
- B. ălei, *n.*, a field.
- B. ălî, *n.*, a crossbow ; — wo, *n.*, a quiver ; — nkli, *v.*, to bend the bow in order to string it ; — hpö, *v.*, to draw up the string in order to let off the arrow.
- B. ălom, *n.*, a road.
ălon a, *adv.*, moreover.
ălö, *n.*, a forest clearing ; *adj.*, like, similar.
- B. ălün, *n.*, a stone ; exponent particle for round-like objects.
am, *n.*, a pot, utensil.
- A. ămaung, *n.*, a dream.
ămbu ey, *v.*, to borrow.
- B. ămé, *n.*, the sky, clouds.
ămlak, *obsolete n.* ; — nauk, *v.*, to love, to like.
ămlek, *adj.*, small, young.
ămlüng, *n.* the mind ; 2, the middle ; — ta, *v.*, to like, to be pleased with ; — klauk, *v.*, to resolve ; — htö, *v.*, to be angry.
ămuam, *adj.*, broken, fractured, lame.
ăn, *the negative and prohibitive particle*.
ăna, *if, the suppositional affix*.
ănau, *n.*, a younger brother, offspring.
—— bé, *n.*, a younger sister (*pron.* ănäbé.)
ăndî, *n.*, a scorpion.
ăndu ey, *v.*, to be hungry.
ănduam, *n.*, a resting, a place.
ăni, *interrogative pron.*, who.
- B. ănik, *adj.*, black.
anku, *n.*, a cough.
ănteăt, *adj.*, tight.
ăntö, *v.*, to awake.
- B. ăoi, *adj.*, yellow.
ăpio, *n.*, a fly.
ăpeam, *adj.*, old.
ăpoung, *n.*, a wall ; B. — *v.*, to clasp, cling to.
- B. ăpok, *n.*, a grandfather.
ăpri, *n.*, a bit, fragment.
ăsa, *n.*, a worm.
ăseng, *adj.*, near.
ăshe, *n.*, a star.
- B. ăshāng ey, *v.*, to be proper, right.

- B. *asham*, *n.*, sound, noise.
asheam, *adj.*, red ; — *so*, *n.*, an infant, (a northern expression).
ashaung, *adj.*, light.
ashau, *adj.*, long.
asho, *n.*, flesh, meat.
asi, *n.*, an elder sister.
asiam, *n.*, a knife ; — *lop or nho*, *n.*, the blade of a knife ; — *ho*,
n., the edge of a knife.
- B. *aso*, *adj.*, wet.
asō, *n.*, a child infant ; *a diminutive particle*.
asoi, *adj.*, short.
- B. *asoung*, *n.*, rice ; — *shé*, cleaned pounded rice ; — *dé*, uncleaned
rice.
aṭa, *n.*, an elder brother.
qui, *adj.*, stinking, rotten.
aung o, *n.*, a crow.
awā, *n.*, light, dawn of day ; 2, a casting net.
awoap, *n.*, a species of leech.
ayam, *n.*, night.
ayat, *ya*, *pron.*, full form of third personal pronoun he, she, it ; *plur.*,
ayau, *adj.*, wide. [ayati, yati, they.
ayauk, *n.*, a bag.
ayi, *adj.*, heavy.
ayei, *adj.*, weary.
ayong, *adj.*, cold.
ayok, *n.*, a corpse.

B.

- ba*, *n.*, a kind of reed ; 2, *a euphonic affix*.
— *leng*, *n.*, a kind of grass.
— *oap*, *n.*, lemon or other fragrant grass.
bā, *v.*, to put into the mouth (as food, &c.).
baan, *adv.*, where.
baung, *interrog. pron.*, which, what.
— *kho-ă*, *adv.*, at what time, when.
bē, *adj.*, other, another.
mbing, *v.*, to shut, close as an aperture or door.
blüm, *n.*, a hill, hillock ; — *bō*, a hill mushroom.
bo, *a qualifying affix*, sometimes makes a neuter verb active.
bo, *v.*, to return.
mbon, *v.*, to be thin.
- B. *bri or pri*, *v.*, to be finished, completed.

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bū, *n.*, cooked food, boiled rice; — am, a pot in which rice is cooked; — am teap, the rice pot cover; — andu ey, *v.*, to be hungry.

buat, buap, *v.*, to cook.

buam, *v.*, to get, obtain.

bük bo, *v.*, to push.

C.

chandon, *n.*, the Khyen dwen River.

B. che pui, *n.*, an associate, friend.

chetong kuht, *n.*, the left hand.

chi or che, *n.*, the waist cloth worn by Khyeng males.

— sauk, *v.*, to put on the waist cloth.

chi, *v.*, to point out, or at.

chian, *v.*, to think, suppose, be of opinion.

chin ye, *n.*, marriage.

D.

dat, *v.*, to dare, *auxiliary affix* (not used singly).

dek, *n.*, the earth, ground; — moan, *v.*, to be possessed of the spirit of the earth; — heam hot, *v.*, to make a propitiatory offering to the earth spirit.

nde, *v.*, to be disgusted.

de, *n.*, a thatched roof.

di, *n.*, a kind of grass for thatching.

dei shop, *n.*, a door; — mbing, *v.*, to shut (as a door); — hü, *v.*, to open (as a door).

din, *euphonic affix*, as 'khoan din lo e', come down.

dina, *suppositional affix*, if, should.

do, an extended line. Exponent particle for long things.

ndo, *v.*, to sting as a bee, or bite as a snake.

doam, *adj.*, idle, lazy, stupid.

dong, *v.*, to jump.

dön, *adj.*, only.

duat, *v.*, to shampoo.

nduam, *v.*, to rest, cease from motion.

dū, *v.*, to die.

E.

ê, *v.*, to eat.

e, *affix of imperative mood*.

ei, *affix of future tense and of infinitive mood*.

B. ek, *n.*, dung, ordure; 2, *v.*, to ease oneself.

ey, *auxiliary affix*.

G.

- gan, *v.*, to be strong, powerful, violent.
 ngan, *v.*, to kick as an animal, as 'no nama ngan u' *the buffalo kicks.*
 gang nu, *v.*, to be not well, sick.
 B. glök, *n.*, a flash of lightning; — klö, *v.*, to flash as lightning;
 — ho, *n.*, a celt, ancient stone implement.
 ngon nu, *v.*, to be busy, not at leisure, as 'kie ngon nu' I have no
 B. go, *num. adj.*, nine. [leisure.
 goi, *num. adj.*, twenty.
 gu, *n.*, a thing, a unit; *genitive particle.*

H.

- ha, *n.*, gold; — oi yum, a gold necklace; — ku siap, a gold finger
 ring; — takli, a gold armlet.
 ha, *also* ngha, *num. adj.*, ten.
 han, *v.*, to yawn; 2, to be rough, bad as a road; 3, *masc. affix for*
 hap, *v.*, to be sharp as a knife, clever as a man. [dogs.
 hbi, *v.* to catch, hold, as 'hbi dina lo e' *bring it.*
 hbo, *euphonic affix.*
 heam, *n.*, silver; — ha, silver and gold, wealth; — hot, *v.*, to go
 with a propitiatory offering.
 hek, *n.*, a louse.
 hēk, *v.*, to lift or take out; 2, *superlative affix*, very, much.
 hi, *v.*, to ask, to question.
 hio (*or* sho), *n.*, a coverlet, blanket; — wo, *v.*, to put on a cover-
 ing; — ankleät, *v.*, to fold up a covering.
 hio (*or* sho), *v.*, to roll up (as a mat or tobacco); 2, to be many;
 3, *a plural affix.*
 B. huiap, *or* shuap, *v.*, to loosen, untie.
 hle, *v.*, to buy.
 hleät, *v.*, to joke, jest.
 hlém, *v.*, to be great, large.
 hlo, *n.*, a shield.
 hloang, *v.*, to expel, drive out.
 hlök, *v.*, to be hot.
 hlüng, *v.*, to be high, lofty.
 hlü, *v.*, to rub, wipe.
 hluam, *v.*, to shake.
 hmiām, *v.*, to be ripe; to be cooked.
 hmu, *v.*, to see.
 hne nü, *n.*, a widow; — bo, *n.*, a widower.

hnato, *n.*, a woman.

hnauk, *v.*, to bark (as a dog) ; 2, to wear (as a garment) ; 3, to put on (as a ring).

hnaük, *v.*, to hammer (as a nail or peg).

hnaung, *euphonic particle*, please.

hnga, *also* ha, *num. adj.*, ten.

— ne pumhot, eleven.

B. hngo, *num. adj.*, five ; 2, to be full, satisfied with food.

B. hngō, *v.*, to growl as an animal.

B. hngō, *n.*, a fish ; — liap, scales ; — pwop, gills ; — hling, dorsal fin ; — pōk hling, ventral fin ; — hōmé, tail ; — sa, dried fish ; — zi nei, salted fish ; — mēngō, broiled fish.

B. hni, *num. adj.*, two.

hni, *n.*, a Khyeng woman's under-petticoat.

hnio, *v.*, to forget ; — hté, *n.*, a melon.

B. hnoan, *v.*, to smell.

hno, *or* nho lop, *n.*, a leaf.

hno, *v.*, to be blunt, as a knife.

B. hnük, *v.*, to pull, drag, draw out.

hō, *v.*, to fan ; 2, to wipe.

ho, *v.*, to dry, set out to dry.

hoan, *v.*, to be young, budding, (*obsolete*).

— nū, *n.*, a virgin, maiden.

hoap, *v.*, to pull with violence.

B. hoat ey, *v.*, to hinder.

hoi, *n.*, a mango.

hói, *v.*, to be a pair or couple, *dual affix*.

B. hok, *v.*, to bark as a deer.

hokka, *n.*, the buttock.

holai khon *or* khoam, *v.*, to meet with suffering, to suffer.

hōmäk, *n.*, chillies.

B. hōmé, *n.*, a tail ; a beard of grain.

hon a, *post pos.*, above, overhead ; *conj.* yet, still.

hot, *v.*, to go, (*obsolete*) ; *as an auxiliary it often gives strength to an active root*.

hot, *num. adj.*, one ; hot a, to-morrow.

hpa, *v.*, to be lawful, right, *an auxiliary verb not used singly*.

B. hpé, *v.*, to allot, divide.

hpean, *v.*, to wear out or away.

hpiän, *n.*, the gown worn by the Khyeng women ; — hio, *v.*, to put on the same.

hpo, *v.*, to arrive.

hpo, *v.*, to sow broad cast.

hpo, *n.*, a snake, serpent.

hpöha, *n.*, a husband.

hpo i, *n.*, cotton; — yong, the cotton plant; — hté, the cotton pod; — nzi, cotton seed; — pé, dressed cotton; — hdeun, a bundle of cotton thread; — hdeun shuan, to dye cotton thread.

hpuan, *adj.*, level.

hték, *n.*, a brute animal; *exponent particle* for fish.

hti or nhti, *n.*, iron.

htin or htên, *n.*, a tree; — haung, *n.* sap.

hto, *n.*, an arrow; *v.*, to change.

B. htum, *num. adj.*, three.

hau, *v.*, to speak, talk.

I.

B. iam, *n.*, a house, dwelling; — sho, the verandah; — kadük, the inner or sleeping apartment; — go, the first or cooking-room.

B. ik, *v.*, to sleep; — duam, *n.*, a bed.

K.

ka, contracted form of first personal pronoun.

kadi, *n.*, the mantis religiosa.

kadük, *n.*, an inside part, a room.

kahni, *n.*, the sun, the sky, a day; — klü, *v.*, to set, as the sun; — sauk, *v.*, to shine, as the sun.

nkap, *v.*, to hawk, clear the throat.

kat, *v.*, to weep, cry.

khlo, *n.*, the moon, lunar month; — hté, to wax; B. — luam, to wane; — yói, the halo round the moon; — wa, to shine as the moon, *n.* moon shine; — soat, to rise; — plé, full moon.

khlaung, *n.*, a man, mankind; — hap, a shrewd, sharp fellow; — so, a child, a youth; — hli, a braggart, boaster, liar; — gan, a strong powerful man, athlete; — gon, a lean man; — oo, a dumb man; — zam, an elder.

khlaung a, *qual. affix* (with 'n' prefixed to verbal root), before, as 'nlo khlaung a' *before coming*.

kho, *aux. verb*, to be able, can; *n.*, an aperture.

khoä, *n.*, time.

kho-a, *n.*, country, region.

khoä, *n.*, dawn, light.

khoam, *also* khon, *v.*, to meet with find.

khoan, *v.*, to descend.

khoi, *n.*, a honey-bee; — uap, a ground bee; — hleng, a tree bee (living in the hole of tree); — hlém, a large kind of bee; — sha, the nest including comb and honey; — ho, a small kind of bee; — haung, honey; — kap, yellow wax; — hne, wax of a blackish colour.

khói, *v.*, to ascend.

khon, *v.*, to sever, divide; 2, to find.

khon *or* khun, *n.*, the domestic or household spirit.

B. — swang ey, *v.*, to introduce the bride to her husband's household spirit.

khong, *v.*, to crow, as a cock.

khuam, *v.*, to fasten, to tie with a string.

kiau, *n.*, a mountain.

kie, *pron.*, I; kie hni, we (dual); kie me, we (plural).

kiě, *v.*, to fear.

A. klāng, *v.*, to intend.

klauk, *v.*, to fall (from a height).

nkleāt, *v.*, to fold up or be folded up.

kli, *n.*, air, wind; — gan, a storm, hurricane.

klo, *or* kloso, *n.*, the spirit attached to a person from birth.

klong, *v.*, to feed, tend as creatures.

klök soat, *v.*, to perspire.

klö, *adj.*, young, budding.

klü, *v.*, to fall (from an erect posture); to slip, sink, set, as the sun.

kluam, *v.*, to enter, go into or under, to dive.

kluāt, *v.*, to grind.

nlük, *v.*, to fell, as timber.

ko, *v.*, to have fever.

kö, *or* — mǎng, *v.*, to groan, moan.

ko ey, *v.*, to coax, flatter.

kói, *v.*, to ascend.

B. — nauk, *v.*, to be becoming, beautiful.

nkoi, *v.*, to split, crack, be broken.

kon, *v.*, to have leisure.

kot, *v.*, to go out shooting, to shoot.

L.

A. la, *v.*, to get obtain; 2, (*aux. verb*) must.

A. lăk, *v.*, to scratch or paw the earth, as a fowl or dog.

- lăt pang kuth, right hand.
 A. lei, *v.*, to be brave, bold.
 ling, *v.*, to set, plant out.
 B. lo, *v.*, to come.
 loan, *v.*, to dance.

M.

- mə, the contracted form of the first personal pronoun in the dual and plural numbers.
 məhaũ kho, *n.*, the mouth.
 məhling, *n.*, the back; — yo, the backbone, spine.
 məhlök kho, *n.*, the throat.
 məho, *n.*, a tooth.
 B. məhno, *n.*, the ear.
 mak, *v.*, to complete, finish.
 məkan, *or* — zām, *n.*, the breast.
 məkho, *n.*, the foot, leg; — muam, *adj.*, lame; — poam, the sole of the foot; — nü, the big toe; — lu, the knee; — miĕ, the ankle; — on, *v.*, to sit down.
 makhũ, *n.*, tobacco; — hêng, *n.*, green tobacco; — sa, *n.*, dried tobacco; — hio, a cigar: *v.*, to roll tobacco; — ok, *v.*, to smoke; — lop, tobacco leaf; — kan, the midrib; — yong, the tobacco plant.
 məkiam, *n.*, the waist.
 məkuht, *n.*, the arm or hand; — nü, the thumb; — mium, the first finger; — dăndălan, the middle finger; — mingo, the third or ring finger; — so, the little finger; — siap, a finger-ring; — ndiam, the finger nail; — be, *n.*, a finger breadth; — mêng, *v.*, to snap the fingers; — po, *n.*, the palm of the hand; — klün, *n.*, the back of the hand; — piām, a knuckle or the wrist; — hnuām, the fist.
 məlé bong, *n.*, the tongue.
 məlu, *n.*, the head.
 məlüng, *or* mlüng, *n.*, the mind, soul, heart.
 məmlei, *n.*, the navel; — yói, *n.*, the navel string.
 mąndo, *n.*, a sting.
 mąnkuam, *n.*, the calf of the leg.
 mąkho, *n.*, the chin; — hmo, the beard.
 mape, *n.*, the thigh.
 mąpium dui, *n.*, urine; — iām, the bladder.

- m̄ashom, *n.*, hair of the head.
 maung, *v.*, to dream.
 mawuam, *n.*, the skin.
 B. mei nai, *n.*, indigo.
 B. mēn, *n.*, fire.
 — nshuām, a piece of fire stick or brand.
 — nku, to smoke.
 B. — nshi, to set fire to.
 — noo, to burn.
 B. — non, to warm oneself by the fire.
 B. — mpwa, to light or make a fire.
 B. — mhuat, to blow a fire.
 — ndo, to blaze up; *n.*, a flame or blaze.
 — mēng, *v.*, to make a noise, bellow, roar, low, or mew.
 B. mīk, *n.*, the eye.
 — kbe, *adj.*, blind.
 B. — ku, *n.*, the eyebrow.
 B. — kuam, *n.*, the eyelid; — hmo, the eyelashes.
 — kbok, *n.*, the white of the eye.
 B. — knik, *n.*, the pupil.
 B. — kli, *or* — khaung, *n.*, a tear.
 — kehe pek, *v.*, to wink.
 mim, *or* mimzām, *n.*, a cat.
 mlo, *n.*, vegetable poison into which arrows are dipped.
 B. mri, *num. adj.*, four.
 B. mlō-i, *n.*, a boat.
 B. mlü, *n.*, a city.
 mo, *n.*, a lord, master, owner, proprietor.
 mo, *interrogative particle*; 2, *euphonic particle*.
 moăn, *v.*, to seize, catch, hold; — buan, *v.*, to have hold of; to obtain.
 moi, *v.*, to be, exist.
 mong, *n.*, the lip.
 muan, *v.*, to be broken, fractured.
 mui, *n.*, an elephant; — ho, an elephant's tusk.

N.

- n*, the negative particle.
na, the suppositional particle, if, should.
na, contracted form of second and third personal pronouns in the three numbers.
nam, *n.*, a village; — zām, a village elder.

- nauk, *aux. verb*, not used singly.
 naun, *pron.*, thou ; naun-hni, ye (dual) ; naun me, ye (plural).
 B. ne, *n.*, a day from sunrise to sunset ; 2, *conjunctive particle*, with, and.
 B. nei, *v.*, to knead, or press into (as salt into fish).
 ney, *v.*, to twist, wring out (as clothes).
 nguap, *v.*, to watch, guard.
 ni, *demon. pron.*, this ; — khoă, *adv.*, now, this time.
 — kha, *adv.*, thus ; — kha shi na, *adv.*, therefore.
 — lon a, *adv.*, also ; *post pos.*, besides.
 B. niē, *v.*, to attend to, listen, obey.
 non, *n.*, a buffalo.
 — ē, to offer to the buffalo spirit, (*lit.* to eat buffalo).
 nū, *v.*, to be abundant.

O.

- B. o, *v.*, to be dumb.
 B. o, *adj.*, pleasant, charming ; *vocative particle*.
 oam, *n.*, vegetables, pottage ; — am, *n.*, the cooking vessel, and
 — am teăp, *n.*, its cover.
 oap, *v.*, to be fragrant, sweet smelling.
 on, *v.*, to remain, rest ; — duam, resting-place, seat.
 op, *v.*, to cut as with a knife.
 oyuan, *n.*, a necklace ; — mon, the beads of a necklace ; — yói,
 the thread on which the beads are strung.

P.

- pakri, *n.*, a green and gold beetle, a species of *Buprestis*.
 pau, *n.*, a word, speech ; — hbo, *v.* to speak.
 paung, *v.*, to cling, adhere to.
 payá, *n.*, a wife ; — sãn, the wife first taken ; — qi, the second wife.
 payo, *n.*, a bird ; — bü, a bird's nest ; — hmo, a bird's feather.
 payü, *n.*, a rat or mouse.
 pei, *v.*, to fly as a bird or as sparks of fire ; 2, to steer as a boat.
 B. pi, *interrog. pron.*, what ; — hio, how much or many (pronounced by the southern Khyéngs as 'pshaw').
 B. — kük, how much or many (be hnit ko, *Burm.*)
 B. piăng, *v.*, to repair, put in order.
 pio, or piăk, *v.*, to cleanse, wash.
 B. pium, *v.*, to be straight.
 plö, *adj.*, shallow as water.



po, *v.*, to follow, accompany, *as an auxiliary sometimes makes active a neuter verb ; also an euphonic affix.*

pom, *n.*, a forest.

poi chi, *n.*, a kind of deer (?).

B. pok, *v.*, to cut as teeth, to come out.

pum, *n.*, a body, unit, thing, exponent particle for mankind and things generally.

S.

B. sa, *v.*, to be dried, as fish or grass.

sām, *v.*, to be great in years, old.

sang, *v.*, to be hard.

sauk, *v.*, to shine as the sun ; 2, to put on (as a man's garment).

saum or shom, *n.*, the hair of the head.

saung, *n.*, paddy ; — hop, the husk or hull of paddy ; — hōmé, the beard of the grain ; — woap, to reap by merely cutting off the ear as is done by the hill people ; — yang, to reap as is done in the plains.

seizei, *adj.*, all.

shāp, *num. adj.*, eight.

shamo, *n.*, a priest, soothsayer.

shami, *n.*, a little thing, a child.

B. shang ey, *v.*, to be proper, fit.

she, *n.*, a leaf ; 2, *num. adj.*, seven ; 3, *adj.*, bad.

she, *imperative of the above*, as 'on hnaung she' let it remain.

shé, *n.*, a horse.

sheāt, *v.*, to count.

shi, *v.*, to be, to be true ; *as an auxiliary it implies the quality, habit, or practice of any being or thing* ; — ba, it is, yes ; nshi nu, it is not, no.

sho, *n.*, a cow.

B. sho, *v.*, to be thick ; *n.*, flesh, meat.

shom, *v.*, to take off (as a cooking pot off the fire).

B. shuāp, *v.*, to untie.

B. shuang ey, *v.*, to own.

B. shui, *v.*, to search, look for.

shuma, *v.*, to geld, castrate.

siāp, *n.*, a finger ring.

siām, *n.*, a knife.

sit, *v.*, to go ; — ey, *v.*, to go ; — nauk, to go courting.

so, *v.*, to bite.

soat, *v.*, to issue, go out ; 2, to look, look at, behold ; 3, to cut as with a knife.

nsoi, *v.*, to kick (as a man).

sok, *v.*, to make trial of (*an auxiliary*, not used singly).

so or su, *v.*, to dig.

son, *v.*, to run, flee, escape ; 2, to taste ; 3, *an auxiliary signifying completion*.

H. sonai, *n.*, sand, lime.

son biăn, *n.*, a young unmarried man.

suam, *n.*, a kind of fairy.

sui, *n.*, the breast ; milk ; — mong, the nipple.

B. swang ey, to cause to enter, introduce.

T.

B. tai, *n.*, a hut.

tamuap, *n.*, ashes.

tanhup, *n.*, to-day.

tau, *adj.*, large, fine, big, superior.

tauam, *n.*, a gourd ; — yum, *n.*, the same ; — té, *n.*, a species of gourd.

tauk ey, to be born (applied chiefly to animals).

te, to commission, order.

nteāng, to be raw, uncooked.

teāp, *n.*, a lid, cover.

nteāt, to be tight, close fitting.

ti, to be, as 'kha ti u' what is it ?

ti or di, *neg. particle*, as 'hbau ei di' be silent.

to, *dem. pron.*, that (*pronounced* sometimes 'tö') ; *v.*, to whet.

ntö, to be awake.

ntö hbo, to awaken.

toi or doi, *n.*, an egg.

tölei, *n.*, medicine.

töni, *dem. pron.*, that ; — khoă, then, at that time.

tong, to discard, reject ; tong hot, to throw.

tou tauk, to weave ; — klaung, *n.*, the beam farthest from the weaver round which the warp is rolled ; — sūm, *n.*, the near beam in weaver's lap round which the warp passes ; — chehnam, *n.*, the strip of hide against which the weaver leans, its ends are fastened to ends of near beam ; — sak, *n.*, a shuttle.

tui, *adj.*, sweet. ; *v.*, to be sweet.

tūk, to kill, destroy.

ntuk, to commission, order.

tu-a, *adj.*, now.

toam, *v.*, to follow, pursue, accompany ; — buan, *v.*, to catch, as
‘ toan ei kabuan niu ’ I have caught him.

tuat u, *v.*, to hide, conceal.

tui, *n.*, water ; — li, *n.*, a lake, pond ; — htūk, deep water ;
— plö, shallow water ; — hlok, *v.*, to bathe ; *n.*, hot spring ;
— miauk, drinking cup ; — dzü, water-pot ; — sauk, bamboo
for holding water ; — kluam, *v.*, to dive ; — hai or hei ey, *v.*,
to be thirsty ; — kium, *n.*, a well ; — nhūk, *v.*, to draw water.

U.

uat nauk, *v.*, to think.

B. uat, or uap, *n.*, a brick.

B. ui, *n.*, a dog ; — han, *n.*, a male dog ; — han bo, *n.*, an old male
dog, a term of abuse ; — yo, *n.*, a mad dog ; — nu, *n.*, a bitch.
ung, *post. pos.*, with, by means of.

W.

wā, *v.*, to be light, as ‘ khlo wa ’ moon-light.

wo, *n.*, a basket.

wo, *v.*, to quarrel. 2, to throw, fling ; — hau, *v.*, to wrangle.

woap, *v.*, to reap ; see ‘ saung’.

woi, *aux. verb.*, to wish, desire.

wok, *n.*, a pig, hog ; — nü, *n.*, a sow.

wök, *v.*, to crawl, creep.

wù i, or ‘ wôi,’ *v.*, to call.

Y.

ya, *pron.*, third person, he, she, it ; — hói, the same, dual, they two ;
yati, they ; — hio, they.

yam, *n.*, night.

B. yam yam, *adv.*, quickly.

yand a, yesterday.

yang, *v.*, to reap.

yau, *v.*, to be broad.

yauk, *v.*, to hear ; — sik, *v.*, to understand, comprehend.

yu si n, *neg. verb.*, ‘ kie yu si nu’, I do not understand.

ye, *v.*, to sell.

yei *v.*, to be fatigued from exertion.

yei shan, *v.*, to invoke a spirit.

B. yō, *n.*, rain ; — o, *v.*, to rain ; — tui, *n.*, rain-water.

yoan, *v.*, to float.

B. yokha, *adv.*, in former times, formerly (she thau kha *Burm.*).

yo, *n.*, a bamboo ; 2, a bone ; — yong, *n.*, the same ; — hncār, *n.*, a bamboo for holding water (*a northern word*) ; — ntang, *n.*, a species of white bamboo ; — nzing, *n.*, a species of bamboo ; — hnā, *n.*, the same.

yo, *n.*, a funeral.

yoī, *n.*, a string or cord.

yong, *n.*, a monkey.

yong ey, *v.*, to be cold.

yum, *n.*, a creeper ; *exponent particle for reptiles.*

yū, *n.*, rice beer.

Z.

zei, *v.*, to work ; za, in northern Khyeng.

nzian, *v.*, to be clear as water.

nzo, *v.*, to ache.

n'zoat ey, *v.*, to chew.

zum, *n.*, a brute animal, *exponent particle for quadrupeds.*

nzum, *v.*, to mark ; recollect, remember.

nzün, *v.*, to be stiff, cramped ; — auk, *v.*, the same.

A Vocabulary in English and Khyeng.

Opposite some of the words in this section appear vocables with a capital N prefixed to them. They are taken "from a man belonging to the Northern tribes", and form part of the vocabularies of languages spoken by tribes in Arakan, furnished to Mr. Hodgson by Capt. (now Sir) A. Phayre, and published by the Asiatic Society of Bengal in 1853.

Subjoined is the system of orthography adopted for them.

a	as	a	in	America.
á	as	a	in	father.
i	as	i	in	in.
í	as	i	in	police.
u	as	u	in	push.
ú	as	oo	in	food.
e	as	e	in	yet.
é	as	e	in	there.
ai	as	ai	in	air.
ei	as	i	in	mind.
ou	as	ou	in	ounce.
au	as	au	in	audience.
o	as	o	in	note.
th	as	th	in	thin.

A.

abandon, *v.*, tong u.
 abhor, *andey* u.
 abide, on u.
 able to be, kho u.
 abode, *n.*, on duam. [ka.
 above, *post pos.*, hon a. N. ada-ma-
 absent to be, moi nu.
 abundance, *n.*, anü.
 abuse, *v.*, mong shé ahau pek u.
 ache, *v.*, anzo or manzo u.
 acid to be, *v.*, ahto u.
 adorn, *v.*, hom bon u. (kie ka hom
 bon u.)
 advice, *n.*, aklam.
 aforetime, *adv.*, yokha.
 afraid to be, *v.*, akië u.
 agreeable to be, *v.*, o u.
 aim, *v.*, anzun u.
 air, *n.*, kli. N. kli.
 alive, *adj.*, ahéng.
 all, *adj.*, sēizēi; kho kho.
 allot, hpé u.
 also, *adv.*, ni lon a.
 ankle, *n.*, kho mik.
 animal, *n.*, zum; hték; yum.
 another, *adj.*, bē.
 ant, *n.*, mring, mling. N. lhing-
 zá-mí.
 arm, *n.*, makuh.
 arrive, hpo u.
 arrow, *n.*, ahto. N. thwá.
 ascend, kói u.
 ashes, *n.*, tamuap.
 ask, *v.*, hi u.
 assistance, *n.*, akü.
 at, among, *post. pos.*, a.
 awake, *v.*, anto u.
 axe, *n.*, ahé.

B.

bachelor, *n.*, son biän.

back, *n.*, mähling.
 bad, *adj.*, shé, hboi nu. N. po-ya.
 bag, *n.*, ayauk.
 bamboo, *n.*, yo.
 basket, *n.*, wo.
 bathe, *v.*, tui hlok u.
 be, *v.*, moi u; shi u; ti u.
 bear, *v.*, sun eyu.
 beard, *n.*, mankho hmo.
 beat, *v.*, adeng u.
 beautiful to be, kói nauk u. *She is*
beautiful, ya kói no u.
 become, *vide* be.
 bed, *n.*, ik duam.
 bee, *n.*, khoi.
 beetle, *n.*, (the green and gold) pakri.
 before, *prep.*, khlaung a; following
 negative verbal root, thus 'nlo
 khlaung a', *before coming*.
 beg, *v.*, hi u.
 behold, *v.*, soat u.
 bellow, *v.*, mēng u.
 below, *post. pos.*, ak or ago (Burm.).
 N. dékan.
 besides, *vide* also.
 better, *adj.*, san ahboi.
 big, *adj.*, ahlém.
 bind, *v.*, khuam u.
 bird, *n.*, payo. N. hau.
 bit, *n.*, aak so.
 bite, *v.*, so u.
 bitter, *adj.*, akhō. N. khau.
 black, *adj.*, anik (Burm.). N. kán.
 bladder, *n.*, mapium dui iam.
 blade (of a knife) *n.*, asiam lop.
 blaze, *v.*, mēndo u.
 blind, *adj.*, mikbé.
 blood, *n.*, ahti. N. ka-thí.
 boat, *n.*, mlö i. N. loung.
 body, *n.*, pum, mapum.
 bone, *n.*, yo. N. kayok.
 borrow, *v.*, ambu ey u.

bow (crossbow), ăli.
brace, *n.*, ăhói.
brag, *v.*, hli *or* hle *u.*
brave, *adj.*, lei.
break, *v.*, ănkói *u.*
breast, *n.*, sui (woman's), măkan.
brick, *n.*, ăat.
bring, *v.*, hbi dina lo *u.*
broad, *adj.*, ăyau.
broil, *v.*, mē ngō *u* (mēn kagō *u*, I broil).
brother, ăta (elder); ănau (younger).
buffalo, *n.*, nón. N. nau.
burn, *v.*, mēn oo *u.*
—— (as a corpse) ănklu *u.* Kănklu mak nui, *I have burnt him.*
busy, *v.*, ngon nu; kie-ngon nu, *I have no leisure.*
buy, *v.*, hle.
by, by means of, *post pos.*, ung.

C.

calf (of leg), manduam.
call, *v.*, wôi *or* wùi *u.*
can, *v.*, kho *u.*
cast, *v.*, wo *u.*
cat, *n.*, min, mimzam. N. mín.
catch, *v.*, moăn *u.* Moăn ei kăbuân niu, *I have caught (him).*
chest (of the body), măkan, măkan-zam.
chew, *v.*, nzoat ey *u.*
child, *n.*, so, shami.
chin, *n.*, mănkhô.
cigar, *n.*, măkhü hio.
city, *n.*, mlü.
clear, *adj.*, ănzian (as water).
cling to, paung *u.*
cloud, *n.*, ămé.
cock, *n.*, ăhlui.
cold to be, ăyong *u*, yong ey *u.* N. ka-young.

come, *v.*, lo-*u.* N. lo.
—— back, *v.*, lo-bo.
—— down, *v.*, khoan dina lo.
—— up, *v.*, khói dina lo.
—— out, *v.*, soat.
companion, che pui, *or* shami pui.
comprehend, *see* understand.
conceal, *v.*, tuăt *u.*
cook, *v.*, buăt *u.*
cord, *n.*, yói.
corner, angle, *n.*, ăkí.
corpse, *n.*, ăyok.
cotton, *n.*, hpo i.
cough, *v.*, anku *u*; thus, yăнку shi *u*, *he is coughing.*
count, *v.*, sheăt *u.*
country, *n.*, khoa.
couple, *n.*, ăhói.
coverlet, *n.*, hio (sho, nearly).
cow, *n.*, sho. N. sharh.
creek, *n.*, ăhom.
creep, *v.*, wōk *u.*
crossbow, *n.*, ăli. Ali kănkli ei, *I will bend the bow* (in order to string it).
crow, *n.*, aung o. N. ăng-au.
cry, *v.*, kat *u.*
cut, *v.*, soat *u.*

D.

dance, *v.*, loan *u.*
dare, *v.*, dat, only used an auxiliary.
dawn, *n.*, ăwā.
deep, *adj.*, ăhtűk.
descend, *v.*, kho ăn *u.*
desire, *v.*, woi *u.*
die, *v.*, du *u.*
dig, *v.*, so *or* su *u.*
dive, *v.*, kluam *u.*
divide, *v.*, khon *u* (sever); hpé *u* (allot).
dog, *n.*, ui; uihan, a dog; ui nū, a bitch. N. ui.



down, *n.*, (soft hair or feathers) hmo.
 drag, *v.*, nhük u.
 draw, *v.*, the same.
 dream, *v.*, maung u.
 drink, *v.*, ok u. N. ú-é.
 dry, *adj.*, as flesh or fruit, sa.
 dung, *n.*, ek.
 dwell, *v.*, on u.
 dye, *v.*, shuan u.

E.

ear, *n.*, manho. N. ka-nhau.
 earth, *n.*, dek. N. det.
 ease oneself, *v.*, ek u.
 eat, *v.*, ē. N. é.
 egg, *n.*, ā toi. N. to-í.
 elephant, *n.*, mui. N. mwí.
 enter, *v.*, wang u.
 escape, *v.*, soan u.
 exchange, *v.*, hto u.
 eye, *n.*, mik. N. mí-ú-i.
 eyebrow, *n.*, mik ku.
 eyelid, *n.*, mik kuam.
 eyelashes, *n.*, mik kuam hmo.
 eight, shāp. N. sat.

F.

fall, *v.*, klü u.
 fan, *v.*, hō u.
 far, *adv. and adj.*, hlo. N. tsú-a al-
 hau a me, *lit.* is it far there?
 father, *n.*, apo; bo. N. pau.
 fear, *v.*, kié u; kie ngié nu, *I am not*
afraid.
 feather, *n.*, hmo.
 female, *n.*, nhato (woman); nü, *female*
particle.
 fever, *n.*, ko.
 field, *n.*, alei.
 find, *v.*, khoam u.
 finish *v.*, bri, pri-mak (*auxiliaries*).
 fire, *n.*, mèn. N. mí.

first, *adj.*, ayāng.
 fish, *n.*, hngō. N. ngau.
 five, *n.*, hngo. N. nghau.
 fit, *adj.*, hpa (*not used singly*).
 flame, *n.*, mēndo.
 flesh, *n.*, sho.
 fling, *v.*, wo; tong hot u.
 flower, *n.*, (lit. orchid) popá. N. pa-
 pá.
 fly, *v.*, pei u.. A fly, *n.*, apio.
 follow, *v.*, toan u.
 food, *n.*, bū.
 foot, *n.*, makho. N. ka-ko.
 forest, *n.*, pom.
 forty, mli gip. N. lhi gíp.
 forsake, *v.*, tong u.
 fowl, *n.*, ā.
 from, *post. pos.*, āgu. N. lá.
 fruit, *n.*, ahté.
 funeral, *n.*, yo.
 four, *num. adj.*, mli. N. lhi.

G.

get, *v.*, buan u; la (*aux. verb*) must.
 give, *v.*, pek u. N. pe-ge.
 go, *v.*, sit; hot (*obsolete*). N. tsit.
 go down, *v.*, (descend) khoan u.
 gold, *n.*, ha.
 good, *adj.*, ahpoi, ahboi. N. be.
 gourd, *n.*, tauam; tauam yum.
 grandfather, *n.*, apok.
 great, *adj.*, ahlém. N. len.
 green, *adj.*, ahéng. N. nau.
 grind, *v.*, kluāt u.
 groan, *v.*, kō u.
 growl, *v.*, hngō u.

H.

hair, *n.*, shom. N. lu-sám.
 hair (down), *n.*, hmo.
 hand, *n.*, makuh. N. kúth.
 handsome, *adj.*, ahpoi.

hard, *adj.*, asang.

hawk, clear the throat, *v.*, ankap u.

head, *n.*, maļu. N. lú.

he, *pron.*, ayat, yat. N. ni (*comp.* this).

hear, *v.*, yauk u. N. ka-yauk.

heart, *n.*, mlüng or malüng.

heavy, *adj.*, ayi.

help, *v.*, akü u.

hen, *n.*, ā nū.

hence, *adv.*, ni āgu.

here, *adv.*, ni a. N. ni-am.

high, *adj.*, ahlüng.

hill, *n.*, blüm.

hinder, *v.*, hoat ey u.

hive, *n.*, khoi sha.

hog, *n.*, wök pa. N. weuk.

hold, *v.*, hbi, toam buam u.

honey, *n.*, khoi haung.

horn, *n.*, aki. N. a-kyi.

horse, *n.*, hé. N. s'hé.

hot, *adj.*, ahlök. N. kho-leik.

house, *n.*, iam. N. im.

how, *adv.*, pikha. N. sbau.

how much or many, pihio. N. hyau-um.

howl, *v.*, mēng u.

hundred, *num. adj.*, pia hot. N. klá-át.

hungry, to be, bū anduey u; hunger, *n.*, N. bu-lan-a-du-i.

husband, *n.*, hpō hā.

hut, *n.*, tai.

I.

I, *pron.*, kie. N. kyi.

if, *conj.*, a na, ana, dina.

in, *postposition*, a dük a. N. duka.

indigo, *n.*, mei nai.

into, *post. pos.*, dük a.

iron, *n.*, nhti or hti. N. thi.

J.

jest, *v.*, hleät u.

juice, *n.*, ahoung.

K.

kick, *v.*, ngan u. No namangan u, the buffalo kicks; nsoi, *v.*, to kick, as a man.

kill, *v.*, tük u. N. tú e.

kindle (a fire), *v.*, mē mpwa u.

knead, *v.*, nei u.

kite, *n.*, amhü.

knife, *n.*, asiām.

know, *v.*, yauk sik u; mhat.

knuckle, *n.*, makuhl piām.

L.

lame, *adj.*, amuām.

large, *adj.*, ahlém.

last, *n.*, anhü.

laugh, *v.*, anwi u. N. a-nwi.

lawful, *adj.*, hpa (*not used singly*).

leaf, *n.*, she, lop, hno. N. shé.

leg, *n.*, kho, makho.

leisure, *n.*, akon. *I have no leisure,* kie ngon u.

let, *v.*, she, hlü a.

level, *adj.*, hpuām.

liar, *n.*, khlaung hli.

lid, *n.*, teāp.

lift, *v.*, ta.

lift up, *v.*, ta bo. N. youk ké.

light, *n.*, wā; awā. *Adj.*, ashaung.

lime, *n.*, sonai.

lip, *n.*, mong.

liquid, *n.*, ahaung.

little, *adj.*, aso, amlek, pleso (*pron. pliso*). *Give me a little,* pliso pék e. N. a-lák-chá-i.

liver, *n.*, ntiām, mantiam.

lofty, *adj.*, ahlüng.

loins, *n.*, kiam, makiam.

long, *adj.*, ashau. N. sou.
 look, *v.*, soat u.
 loom (weaving apparatus), tou.
 lord, *n.*, boyó.
 loosen, *v.*, shuǎp u.
 louse, *n.*, hek.
 love, *v.*, amlak nauk u.

M.

mad, *adj.*, ayo.
 maiden, *n.*, hon nü.
 make, *v.*, sei ; zei, za.
 male, *n.*, pato (man).
 man, *n.*, khlaung. N. kláng.
 manner, *n.*, kha.
 many, *plur. affix*, hio, lòi, tak, nu.
 mark, *v.*, nzun u.
 mat, *n.*, adön.
 meat, *n.*, sho.
 medicine, *n.*, tölei.
 meet, *v.*, khoan *or* khon u.
 melon, *n.*, hnio hté.
 melt, *v.*, ngaung u.
 milk, *n.*, sui, sho sui (cow's milk).
 mind, *n.*, mlüng.
 mix, *v.*, nhot u.
 moan, *v.*, kō u.
 monkey, *n.*, yong. N. young.
 moon, *n.*, khlo (also month). N. khlau.
 ——— light, *n.*, khlowā.
 more, *adj.*, san.
 morrow, *n.*, hot a.
 mother, *n.*, anū, *or* aū. N. nú.
 mountain, *n.*, kiau. N. toung (Burm.).
 mosquito, *n.*, ahang. N. young-yán.
 moustache, *n.*, mong mho.
 mouth, *n.*, mahau kho. N. hak-kau.
 much, *adj.*, *vide* many. N. a-pa-luk (Burm.).
 murder, *v.*, tük u.
 mushroom, *n.*, abo.

must, *aux. verb*, la.
 my, *adj.*, kie ku.

N.

name, *n.*, aming, ameng. N. námí.
 navel, *n.*, mlei, mamlei.
 ——— string, *n.*, mlei yóí.
 near, *adj.*, aseng u. N. a-shyo-zo-yan.
 neck, *n.*, hlöt-kho.
 ——— lace, *n.*, o yoam.
 nest, *n.*, payo bu.
 net, *n.*, awā.
 night, *n.*, ayam. N. a-yán.
 nine, *num. adj.*, go. N. ko (Burm.).
 no, *adv.*, nshi nu. N. hí-a.
 now, *adv.*, tu a ; ni khoā. N. tú a.

O.

oh, *interj.*, o.
 obey, *v.*, ni ey u.
 obtain, *v.*, buan u.
 oil, *n.*, shi haung. N. to.
 old, *adj.*, apeam.
 ——— man, sām bo.
 ——— woman, san nü.
 on, *post. pos.*, a, agu. N. há-nang.
 only, *adj.*, dön.
 order, *v.*, āna pek u.
 other, *adj.*, bē.
 otter, *n.*, aham.
 outside, *n.*, plaung a. N. kláng-a-me.
 own, *v.*, shuan ey u.
 one, *num. adj.*, hot. N. nhát.

P.

pair, *n.*, ahóí.
 perspire, *v.*, hlok soat u.
 pig, *n.*, wok.
 pleasant to be, o u.
 pork, *n.*, wok sho.

pot, *n.*, am.
pull, *v.*, ndang u ; nhük u.
pursue, *v.*, toan u.
put on, (as a man's garment) sauk u ;
(as a woman's garment) hio u ;
(as a ring), nauk u.

Q.

quarrel, *v.*, wo u.
quick, *adj.*, ayan kha.
quickly, *adv.*, ayan yam.
quiver, *n.*, ali wo.

R.

rainbow, *n.*, nagā han.
rain, *n.*, yo ; *v.*, yo oo u.
raise, *see* lift up.
reap, *v.*, yang u.
recollect, *v.*, anzun u.
red, *adj.*, asheam. N. sen.
region, *n.*, khoa.
remain, *v.*, kiuān u.
repair, *v.*, piang u.
repeat, *v.*, hau bo u.
return, *v.*, bo u.
rice, *n.*, saung.
rough, *adj.*, ahan.
run, *v.*, son u. N. cho-né.
road, *n.*, alom. N. lám (Burm.).
roar, *v.*, mēng u.
round, *adj.*, a-lum. N. pú lú.

S.

salt, *n.*, zi, shi. N. tsí.
sand, *n.*, sonai.
sap, *n.*, htēn or htin haung.
see, *v.*, mhu u.
sell, *v.*, ye u.
serpent, *n.*, hpo.
seven, *num. adj.*, she. N. s'hé.
sever, *v.*, khon u.
shallow, *adj.*, aplö.

shampoo, *v.*, duat u.
shine, (as the sun) sauk u.
——, (as the moon or stars) wa u.
short, *adj.*, so i. N. twé.
sick, *adj.*, gāng nu (*lit.* not well).
silent be, hbau ei ti. N. mhé.
silver, *n.*, heam.
sister, (elder) *n.*, asi.
six, *num. adj.*, sop. N. sauk.
skin, *n.*, wum, mawum. N. wún.
sky, *n.*, ame. N. han mhi.
sleep, *v.*, ik u. N. ip.
small, *adj.*, amlek, aso. N. ná-ó.
snake, *n.*, hpo. N. phol.
snatch, *v.*, hot u.
sole (of foot), *n.*, makho pom.
son, *n.*, aso.
song, *n.*, sitchan.
sour, *adj.*, ahto. N. to.
sow, *n.*, wok nü.
speak, *v.*, hau u. N. há-we.
spear, *n.*, sauk chi.
spider, *n.*, akü.
spine, *n.*, mähling yo.
spirits, *n.*, alak haung.
star, *n.*, ashe. N. áá-shé.
steer, *v.*, pei u.
stone, *n.*, alum. N. lun (Burm.).
storm, *n.*, kli gan.
straight, *adj.*, apiaung or apium, B.
strike, *v.*, deng u. N. mo-lé.
stupid, *adj.*, doam.
suitable, *adj.*, hpa (not used singly) ;
don ey u ; ashang ey u.
sun, *n.*, kahni. N. ko-nhi.
superior, *adj.*, tau.
superlative affix, very, much, hēk.
sweat, *v.*, aklök soat u.
sweet, *adj.*, tui. N. tú í.

T.

tail, *n.*, hōmé.

talk, *v.*, hau u.
 tall, *adj.*, ahlüing. N. lhun.
 tattoo, *v.*, amhaung shuan u.
 ten, *num. adj.*, ha. N. há.
 that, *pron.*, to, tōni. N. oní.
 then, *adv.*, to-khoã. N. ní-kho-a,
 (*vide* now).
 there, *adv.*, to a ; sówa ; sóbra. N.
 tsú-a.
 they, *pron.*, nahoi (dual) ; ayatti
 (plur). N. ni-di or ni-li.
 thigh, *n.*, mape.
 thick, *adj.*, a sho.
 thin, *adj.*, ambon. N. páam.
 think, *v.*, uat nauk u.
 thirsty to be, ha or hei u. Thirst,
n., N., tú í lan-a-du-i.
 thirty, *num. adj.*, htum gip. N. tún
 gíp.
 thou, *pron.*, naun. N. náng.
 thine, *pron.*, naun ku. N. náng-ko
 three, *num. adj.*, htum. N. htúm.
 this, *pron.*, ni. N. ni. Northern
 Khyeng, for 'he', *pron.*
 — much, ni hio.
 thorn, *n.*, ahlíng.
 throat, *n.*, mahlōk kho.
 throw, *v.*, wo u.
 thumb, *n.*, makuht nü.
 tie, *v.*, khuan u.
 tiger, *n.*, akié. N. kyí.
 tight, *adj.*, anteát.
 time, *n.*, khoã.
 to, *post. pos.*, a. N. á.
 to-day, *n.*, taphup. N. tun-ap. N.
 ko-nup = day.
 to-morrow, *hot a.* N. nhát-a.
 tobacco, *n.*, makhü.
 toe, makho nü (great) ; makho zo
 (little).
 tooth, *n.*, maho. N. ka-hau.
 tree, *n.*, htēn or htīn. No. thín.

try, *v.*, sok (not used singly).
 true to be, *v.*, shi (substantive verb).
 twenty, *num. adj.*, goí. N. kúr.
 two, *n. adj.*, hni. N. pan-nhí.

U.

under, *post. pos.*, ako, ago.
 understand, *v.*, yauk-sik u. N. ne.
 untie, *v.*, shuáp u.

V.

vein, *n.*, ahti klong.
 village, *n.*, nam. N. nám.
 virgin, *n.*, hon nü.

W.

wane, *v.*, (as the moon) luan u.
 wash, *v.*, pio, pio piák u.
 watch, *v.*, nguap u.
 water, *n.*, tui. N. túi.
 wax, *n.*, khoí kap ; *v.*, hté u.
 weave, *v.*, tou tauk u.
 we, *pron.*, kie hni (dual) ; kie me
 (plur.). N. kin ni.
 weep *v.*, kat u. N. akáp.
 well, *n.*, tuí kium.
 well, to be, kang u.
 wet, *adj.*, aso.
 what, *pron.*, baung ; pi. N. í-níhám.
 when, baung khoã ; pi khoã. N.
 í-kho-á.
 where, *adv.*, baan. N. í-ní-ám.
 whet, *v.*, to u ; asian ha to u, to whet
 a knife.
 which, *pron.*, baung ; pi. N. í-ní-a-
 ka.
 white, *adj.*, abok. N. buk.
 who, *pron.*, ani. N. ú-li-am.
 whole, *adj.*, kho kho ; zei zei.
 wide, *adj.*, ayau.
 widow, *n.*, hne nü.

widower, *n.*, hne bo.

wife, *n.*, paya.

wind, *n.*, k̄li.

wink, *v.*, amiḥ che peḥ u.

wipe, *v.*, hō u.

wish, *v.*, woī u.

with, *post. pos.*, ung. N. yung.

within, *post. pos.*, dūk a. N. dú-gá-mé.

woman, *n.*, hnato.

wood, *n.*, htěn sho.

word, *n.*, pau.

work, *n.*, asei.

wrist, *n.*, mēkuht-piām.

Y.

yam, *n.*, aḥá. N. ba-há.

yawn, *v.*, han u.

yellow, *adj.*, aoi.

ye, *pron.*, naun hni (dual) ; naun me (plur.). N. náng-ni.

yes, ö ; ö ö ; shi ba. N. a-hi. [*Compare* hi, *v.*, to ask.]

yesterday, *n.*, yand a. N. yam-tu.

yet, *conj.*, hon.

you, *pron.*, naun hni, nahói (dual) ; naun me, nahio (plural).

young, *adj.*, amlék ; aseo.

youth, *n.*, khlaung zo ; son biān.

On a Coin of Kunanda from Karnāl.—By BA'BU RA'JENDRALA'LA MITRA.

(With a woodcut.)

The mintage of which the woodcut at the end of this article is a representation is well known to Indian numismatists. It has been noticed by Prinsep, Wilson, Cunningham, and others ; and in a learned essay in the first volume of the New Series of the Royal Asiatic Society's Journal (pp. 447 ff.), Mr. Thomas has described it at great length and in full detail. There are, however, a few points in connexion with it which the uncommonly fine specimen presented to the Society by the Rev. M. M. Carleton of Karnāl enables me to explain with some confidence.

In all essential particulars, Mr. Carleton's specimen is identically the same as the British Museum one figured by Mr. Thomas. It has on the obverse the curiously-antlered deer, the lady with a lotus, the square monogram, and the Western Cave character legend, so graphically described by Mr. Thomas, and all the Buddhist symbols, and the Bactrian or Ariano-Páli legend, noticed by him on the reverse of the British Museum specimen. The size is exactly the same, and the configuration of the symbols is identical, except of the rectangular monogram, the cross line in the middle of which is very faint and scarcely visible. The style of some of the old Sanskrit characters in which the Páli legend is given, is, however, different, and it proves the coin before me to have been struck from a different die from what was used for the British Museum specimen. Owing to its better state of preservation, its weight, too, is greater, being 34·1 grains against 29 grains of the other.

The differences in the letters of the obverse legend are not numerous, but they are well-marked and unmistakable. The first letter in the British Museum specimen is shaped somewhat like an English *s*, whereas in the specimen before me it is clearly like the English *j*; it is, however, in either case intended to stand for the Sanskrit $\text{र} = r$. The second letter in the former specimen, is a compound of *j* and *ṇ* followed by a visarga, the Sanskrit $\text{जः} = jṇah$,—the *j* taking the full depth of the line with the visarga after it, and the *ṇ* hanging down below it. In the latter the *ṇ* occupies the place of the *j* in the body of the line, and the *j*, if it ever existed, must have stood above the line, and is lost by the want of space in the margin. The visarga occurs after the *ṇ*. In the former case the word has to be read *rājṇah*, the genitive singular of *rājan*—‘of a king’, and in the latter, if the assumption of a *j* over the *ṇ* be not admitted, *raṇah* the type of the modern *rāṇā*, ‘a king’. The name which follows being in the genitive, the epithet should also be in the same case, and so I have no doubt that when the margin of the coin was perfect, there was a *j* over the line just above the *ṇ*, and the word was *rājṇah*, the genitive of *rājan*, as in Mr. Thomas’s specimen.

In the second word, the nasal mark (*anusvara*) after the *ṇ* is absent in the British Museum specimen as figured by Mr. Thomas, but it is distinct in Mr. Carleton’s coin.

The first half of the third word is identical in both, but the second half in the specimen before me is clearly *bhatisa*, and not *bhatasa* as shown in Mr. Thomas’s figure, nor *bhratasa* as it has been read by that gentleman.

In the last word *maharajasa*, the *r* is formed of a perpendicular stroke like an *I*, and not a stroke with a curled tail like *J*, as in the first word and in the British Museum specimen. The $\text{ज} = j$ is also slightly different, being more like the Greek Σ than the English £ , as in the latter.

Adverting to the reading of the second word, Mr. Thomas says: “The monarch’s name on this series of coins has hitherto, by common consent, been transcribed as Kunanda, and tested by the more strict laws of its own system of Palæography, the initial compound, in Indian Pāli, would preferentially represent the letters *ku*. There can be little doubt, the true normal form of the short *u* (*U*), which can be traced downwards in its consistent modifications in most of the Western Inscriptions, though the progressive Gangetic mutations completely reversed the lower stroke of their *u* (*U*). The question of the correct reading of the designation has, however, been definitively set at rest by the Bactrian counterpart legends on the better preserved specimens of the coinage, where the initial combination figures as *kr*, a transliteration which any more close and critical examination of the rest of the Indian Pāli legend would, of itself, have suggested, in the parallel use of the same subjunct *U* in *भन bhrata*.”*

* Journal, R. As. Soc., N. S., I., p. 476.

This argument, however, is not conclusive, as Mr. Carleton's coin is as well preserved as any I have seen of so old a date as three hundred and twenty-five to three hundred and forty years before Christ, every letter being perfectly distinct and as sharp as when first issued from the mint, and in it the lower limb of the Bactrian *k* of the reverse is perfectly straight and blunt, showing not the smallest trace of a spur or curl to the right. And even with the curl, the indication is not so decisive as could be wished, for a very slight bend in the foot often occurs in this class of writing without meaning any consonantal or vowel affix. It is the result of hasty writing, in which the pen is not taken off the paper before it has already produced a tail. It was this tail which changed the original Indian \dagger successively into $\dagger \ddagger \S \P$. In the Ariano-Páli character several instances may be easily cited in ancient inscriptions, where the lower limb, although ordinarily straight, has sometimes been curled or spurred. Thus the *ch*, ordinarily written \S , is sometimes provided with a spur, thus Σ .^{*} The spur is again used for *u*, as in \angle , which Professor Dowson takes for *mu*, and also for *y*, as in Ξ , which the same gentleman takes for *syā*.[†] Adverting to this curl in the Baháwalpur inscription, he further says: "It proves, however, that the curl of the foot of a consonant indicates that consonant to be doubled, and not to be always, as hitherto supposed, a consonant combined with *r*. From the frequent combination of *r* with other consonants in Sanskrit, this twist of the bottom of a letter represents the letter more frequently than any other; but as we here find the *s* curled round to represent the *sy* of the Sanskrit genitive, there can be no doubt it represents the doubled consonant—that doubled consonant being here the equivalent of *sy*. In most other instances, as in Achayya for Achárya, it is the equivalent of *r* combined with another consonant. This substitution of doubled for compound consonants brings the language into much closer relation with the Páli." It should be remarked, however, that this inference, ingenious as it is, is redundant; for the language of the inscription being the old Páli of the Kapurdigiri monument, the genitive should require no *y* after *s*, and the curl may pass for an ornament or a variant form as in the case of *ch* noticed by him, and referred to above.

Epigraphic evidence being thus far unsatisfactory and inconclusive, though from the more frequent occurrence of the spur to the right for *r* in the Bactrian Mr. Thomas's reading is the most consistent, it is necessary to turn our attention next to the etymology of the word, not with any great hope of a decisive result, for the ductility and plasticity of the Sanskrit language are quite against such an expectation, but only to see on which side

* Journal, R. As. Soc., XX., plate IV.

† Loc. cit.

‡ Ibid., N. S., IV., p. 501.

the balance of evidence inclines most. The aptote noun *ku* in Sanskrit and its affiliated languages is a particle of depreciation, implying 'low', 'vile', 'bad', 'wrong', &c.,* and it might at first sight appear improbable that it should be used as a prefix to a royal name; but, seeing that in India such depreciatory particles are deliberately adopted by Hindu parents to avert evils and for other causes, the objection may be set aside as of no weight. *Tinkori*, "three cowri shells," *Páñchkori* "five cowri shells," *Sátkori* "seven cowri shells," *Nakori*, "nine cowri shells," and similar other terms, all meaning 'worthless', are extensively used as proper names, in order that no evil eye may rest on the children to whom they are assigned, and the children may be allowed to thrive without exciting envy, malice, or jealousy. *Bhuto* "blacky," *Khonrá*, "lame," *Nulo* "weak-handed", and the like,† are also of frequent occurrence as proper names. An accident or misfortune happening on the day of a babe's birth is also often memorialized by assigning a bad name to the newcomer, and such nicknames, like any other mud, stick, and cannot be shaken off. Again, the horoscope of a babe might indicate that he would in after life be evilly disposed, and this may likewise influence the choice of a name for him. And any of these facts may easily be assumed to account for the use of an offensive prefix like *ku* in the name in question.

No assumption of the kind, however, is necessary in the present case. As a common noun *ku* means 'the earth', and joined to *nanda*, it would mean the "earth's delight", a very appropriate name for a lad, whether a prince or otherwise. No fond mother could wish for a better name for her young hopeful.

If we take the first syllable of the name to be *kra*, we must look for its root in *kri*, which means, 'to do,' 'to make,' 'to perform any action,' or 'to hurt,' 'to injure' or to 'kill'. Added to *nanda* it would mean the promoter, or destroyer, of delight, and the former would unquestionably make a very appropriate proper name. But if we accept *kri* to be the root, its participial form should follow the word *nanda*, and not precede it. Mr. Thomas says that the late Dr. Goldstücker was of opinion "that the *kra*, in combination with *Nanda*, may possibly stand for *ॠ kri*, "a million", or some vague number corresponding with Mahápadma (100,000 millions), under the supposition that the latter designation was applied to one of the Nanda family, in its numerical sense, as a fabulous total, and not in the more usually received meaning of "a large lotus."‡

The learned doctor was doubtless a very conscientious worker and a

* कुमतिप्रादयः । २ २. १८ । Páṇini.

† When a person gets too many female children, the last not unfrequently gets the name of *Arud* "no more", to express the satiety of the parents.

‡ Journal, R. As. Soc., N. S., I., p. 476.

thorough scholar, and he may have somewhere found authority for the above; but I have not been able to find in any dictionary the word *kri* with the meaning of 'a million', and my friends among the Professors of the Sanskrit College of Calcutta have also failed to find out any authority for such a meaning. Professor Mahes'achandra Nyáyaratna authorises me to say there is no such meaning.

Kra is sometimes used in compounds as an onomatopoeic term for a clicking sound, as in *krakacha* for 'a saw', but it is of no value in the explanation of the word under notice. The root *kri* = क्रि "to buy" with the affix ञ would make *kra* "a purchaser", and it added to *nanda* would mean "the delighter of buyers", but such a term for a royal proper name is as unlikely as possible. Thus then, on the one hand, palæographic evidence is not positively in favour of the reading *kra*, etymology, on the other, is all but decidedly against it; and, seeing that in the Greek and Persian transcriptions of the name, as quoted by Mr. Thomas, the *r* has been dispensed with, I am disposed to think that the balance of evidence is in favour of the old reading.

The first half of the third word is identically the same in the Páli legend of Mr. Thomas's figure and Mr. Carleton's coin, and can be read only as *amagha*. The Bactrian version of the latter has also the same reading. In the Bactrian version of the former there is, however, a spur under the *m*, which must be read, and has been very correctly read by Mr. Thomas as the equivalent to *o*, and not of *r*, as he takes the spur to be in the first syllable of the second word. It is well known that in the Páli, as in the modern Kuṭhiwál, the vowel marks were very much neglected (in the very coin before us *rájnah* is written *rajnah*, and *mahárájá*, *maharaja*), and there is no reason when the mark is given in one place why we should not supply it where it has been dropped. The reading therefore may be accepted unquestionably as *amogha*, meaning "unfailing" or "unflinching". The first letter of the second half of the third word is *bha* in both the legends of Mr. Carleton's coin and in the Páli legend of Mr. Thomas's figure. The foot of the letter is perfectly straight, and there is not the slightest indication of any spur below it, nor sufficiently marked at the right end of the middle stroke to be taken into account. But in the Bactrian version of the latter there is a barely perceptible tendency to a curl which as in the case of the first syllable of the second word Mr. Thomas takes to be an *r*. The next two syllables are unquestionably and unmistakeably *ti* and *sa* in both the legends of Mr. Carleton's coin and in the Bactrian version of Mr. Thomas's figure, but *ta* and *sa* in the Páli version of the latter. Now, as superfluous addition of vowelmarks is not a peculiarity of the Páli, though omissions are, it must follow that the correct reading of the word is *bhatisa* or *bhratisa*, and not *bhratasa*.

The question then arises what does *bhatisa* or *bhratisa* mean? and the reply has already been given by Prinsep, Wilson, Cunningham, and Thomas, that it is equivalent to *bhratasa* "of a brother". But, notwithstanding the most profound veneration for the unanimous opinion of such high authorities, I cannot divest myself of a doubt as to its accuracy. The word *bhrátá* comes from the Sanskrit crude noun *bhrátri*, and is analogous to *pitá* from *pitri*, "father," *mátá* from *mátri*, "mother," *svasá* from *svasri*, "sister", and other words ending with the vowel *ri* in the crude form. Now, in all the European languages of Aryan origin the final *ri* of the Sanskrit is represented by *ar*, not *i* or *ri*. Thus, *pitri* becomes *πατήρ* in Greek, *pater* in Latin, *fator* in Old High German, *fader* in Anglo-Saxon, and *fader*, *fadar*, *vader*, *father*, &c., in others. In Persian it is *pidar*. *Mátri*, in the same way, becomes, Greek *μήτηρ*, Latin *mater*, Old English *moder*, Anglo-Saxon *modor*, Danish and Swedish *moder*, and *muotar*, *muatar*, *muter*, *mutter*, &c., in other languages. In Persian it is *mádar*. *Svasri* also becomes *suster*, *sustre*, *sostre*, *sweoster*, *swester*, *swyster*, *swistar*, *soror*, *sister*, &c., always changing the Sanskrit *ri* into *ar*, *er* or *or*, never into *i* or *ri*. In the Indian vernaculars *ri* when final changes into *á*, in the plural *ar*,* and this was also the case in the Ariano-Páli, the Ceylonese Páli, and the Prákrits. These instances would fully justify the inference that *bhrátri* should change in the same way; and, as a matter of fact, we have for its counterparts in the Greek *φράτωρ*, Latin *frater*, French *frère*, Anglo-Saxon *brodhor*, Old High German *pruadar*, English *brother*, &c., &c., the change everywhere being analogous to what takes place in *pitri*, *mátri*, and *svasri*. In Páli and Prákrit it becomes *bhátá*. In the Taxila inscription line 4, we have *bhratara* in the plural,† in the Pesháwar Vase *bhraterhi*, plural,‡ and on the Wardak Vase *bhrátá* as read by me, and *bhadar* as read by Professor Dowson,§ everywhere the *ri* changing into *ar* or *á*, but nowhere into *i*. And as the coin legend is written in the same language in which the inscriptions are recorded, I venture to think that the assumption of the word in the coin (*bhrati* or *bhati*) being a Páli form of *bhrátri* quite inadmissible. There is not a tittle of evidence to support it.

Extraneous evidence on the subject is also against the assumption. I believe it is not usual with kings to pride themselves upon their being a brother to some one. In India the idea is particularly repugnant. An old Sanskrit adage says, "He is great who is known by his own name; he is so and so who is known by the name of his father; he is vile who is known

* The Hindi *máyi* may at first sight appear an exception, but in reality it is not so, the final *i* in it being an honorific affix, and not the remnant of the Sanskrit *ri*. *Bháyí* in Bengali and Hindi are exceptions.

† Journal, R. As. Soc., XX., p. 223.

‡ Ibid., p. 241.

§ Ibid., p. 261.

by the name of his mother ; he is the lowest of the low who is known by the name of his father-in-law",* and the action of men has everywhere in this country been regulated by this maxim. A brother holds a lower grade than a mother, and he who should wish to be known in his coins by the name of his brother, must have been lower than the vile being who is known by the name of his mother. Doubtless when a brother exercises paramount power, his name cannot be avoided, and Mr. Thomas very correctly argues that the fact of the Nanda brothers having ruled jointly may justify the assumption of Amogha having been the eldest brother, and his name had therefore to be used. This, however, would pre-suppose that the name of the eldest brother was well known, which is not the case. The Puráṇas and the Maháwanso give only three names, viz., Sumálya, Mahápadma Nanda, and Dhana Nanda. In a mediæval paraphrase, by Anantakavi, of the *Mudrárákṣhaśa*, the nine brothers are thus named : Udagradhanva, Tikshṇadhanva, Vikatadhanva, Utkatadhanva, Prakatadhanva, Sankatadhanva, Vishamadhanva, Sikharadhanva, and Prakharadhanva.† These names are evidently fanciful, and cannot be relied upon. Anyhow no ancient or mediæval work mentions *Amogha*, and the assumption of *Amogha* being a proper name is founded solely upon the strength of the supposed meaning of the word *bhratara* 'a brother', with which it is compounded in the coin legend, and that being untenable, the assumption must fall to the ground. I have already pointed out that *amogha* as a common noun means 'unflinching' or 'unfailing'. Now, the most appropriate words that can be joined with it are valour, protection, and faith. The first, however, has no Sanskrit equivalent which can be represented by *bhratisa* or *bhatisa*, so it may be at once set aside. *Bhri* "to protect" becomes *bhartri* "protector" in the crude form, and *bhartá* in the nominative singular. In the Páli its counterpart would be *bhattá* or *bhatá*, (in the modern Bengali it is *bhátár* for 'a husband'), and had the reading been *bhatasa* or *bhratasa*, the compound term of the coin could have been taken for an "unfailing protector", but the mark of the i over the t will not admit of this interpretation. The last word 'faith' is represented in Sanskrit by *bhakti*, which in Ceylonese Páli becomes *bhatti*;

* खनामा पुत्रो धन्यः पित्रनामा च मध्यमः ।

अधमो मातृनामा च श्वशुरनामाधमाधमः ॥

† अनन्तकविकृतमुद्राराक्षसपूर्वपीठिका ।

विविधाद्भुतगुणगणवल्लीमूलकन्दो निखिलजननयनानन्दो जगद्धिदित-
सुधन्वाभिधो नन्दो राजा बभूव । तस्य च सकलसीमन्तिनी सीमन्नरत्नं रत्नावली नाम
महिषी बभूव । तस्य च उदयधन्व-तीक्ष्णधन्व-विकटधन्व-उत्कटधन्व-प्रकटधन्व-सङ्कटधन्व-
विषमधन्व-शिखरधन्व-प्रखरधन्वाभिधाना नवद्वीपाधिपतय इव नवोद्यद्दिन्दुसुन्दराधिरासुषा
नव सूनवः समजायन्त ।

I know not what it was in the Ariano-Páli, but, seeing that one of a doubled consonant is frequently elided in modern vernaculars, I am disposed to think that such was also the case in ancient times in the Ariano-Páli. If this be admissible, the *amogha-bhati* of the coin may be accepted to mean "he of unflinching faith". Such an epithet for a person who has been careful enough to delineate half-a-dozen different symbols of his religion on his coins, would by no means be inappropriate or questionable, and I have no hesitation in adopting it as the right one. We have here only an ancient version of the "Gházíuddin" of the Pathán coins of India, and the "Defender of the Faith" of the modern English currency.

According to these remarks the legend and its translation would stand thus—

Legend—*Rájnah Kunandasa amogha-bhatisa mahárájasa.*

Translation—Of the great king, king Kunanda, of unflinching faith.



Mr. Thomas identifies the sovereign named in the coin with the Xandrames of the Greek writers and the Nandas of the Puráṇas, and this would carry the age of the coin to some years before 317 B. C., when Chandragupta wrested the sovereignty of Magadha from the Nandas. There are several weak links in the chain of reasoning by which Mr. Thomas establishes this identity, but on the whole it is very plausible, and I am not in a position now to suggest anything better.

P. S. Since writing the above I have learnt that in the *Parás'ara Sañhita*, *Kuninda* is used as the name of a tribe, and *Kauninda* that of its country.

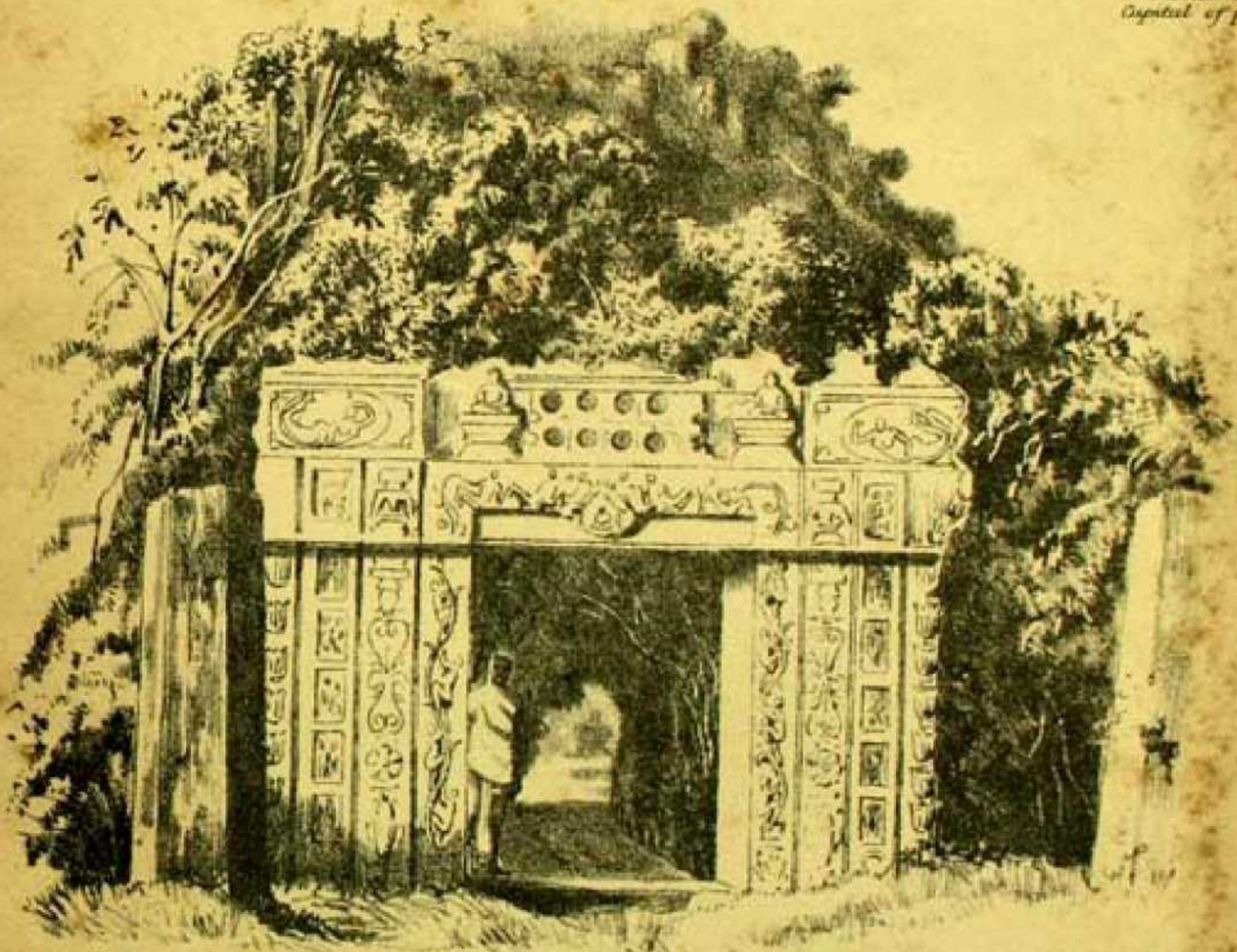


Capital of pillar.



Panel below capital of pillar.

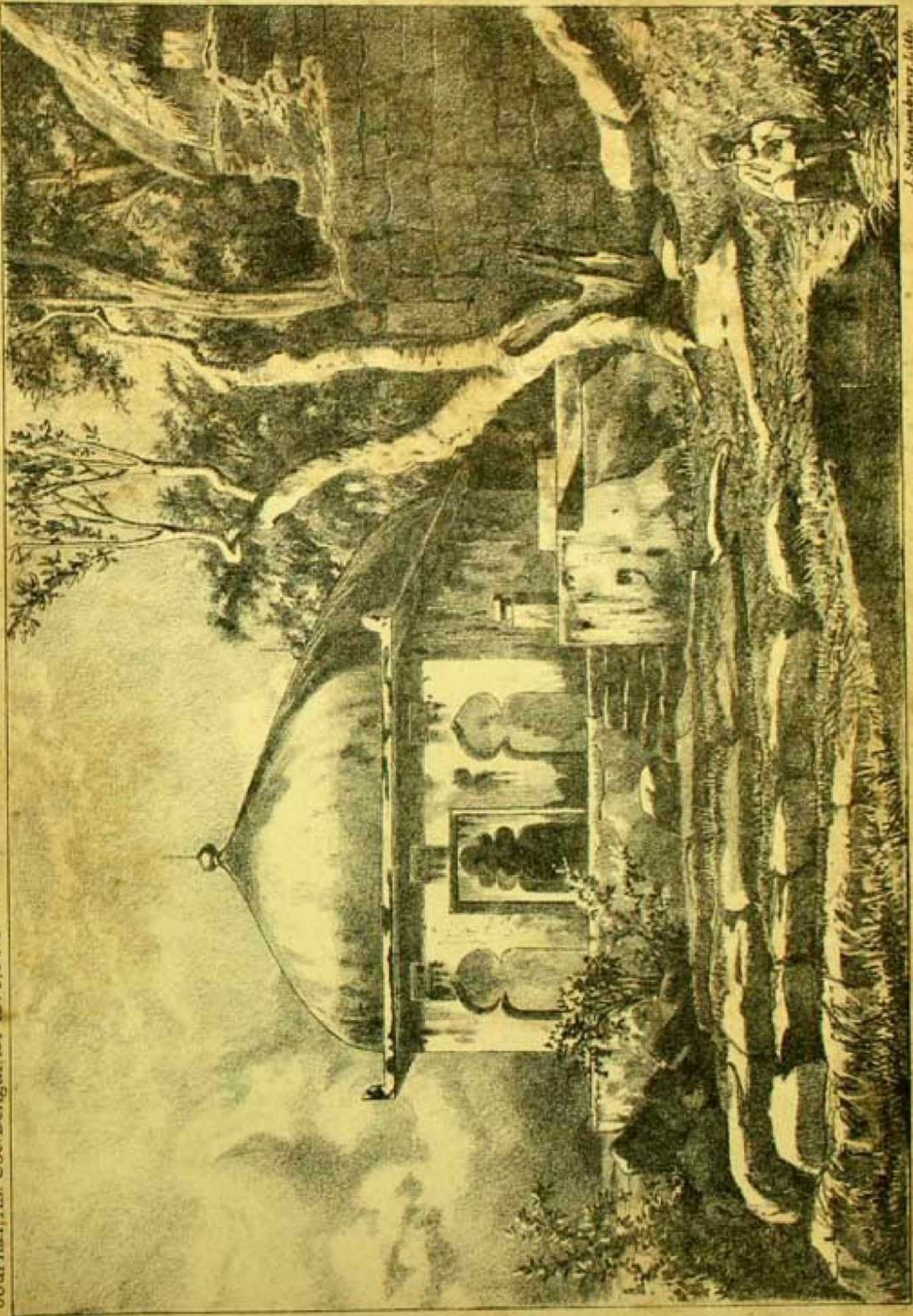
Sculptures on the left panel of gateway at Udayagiri.



Gateway at Udayagiri.



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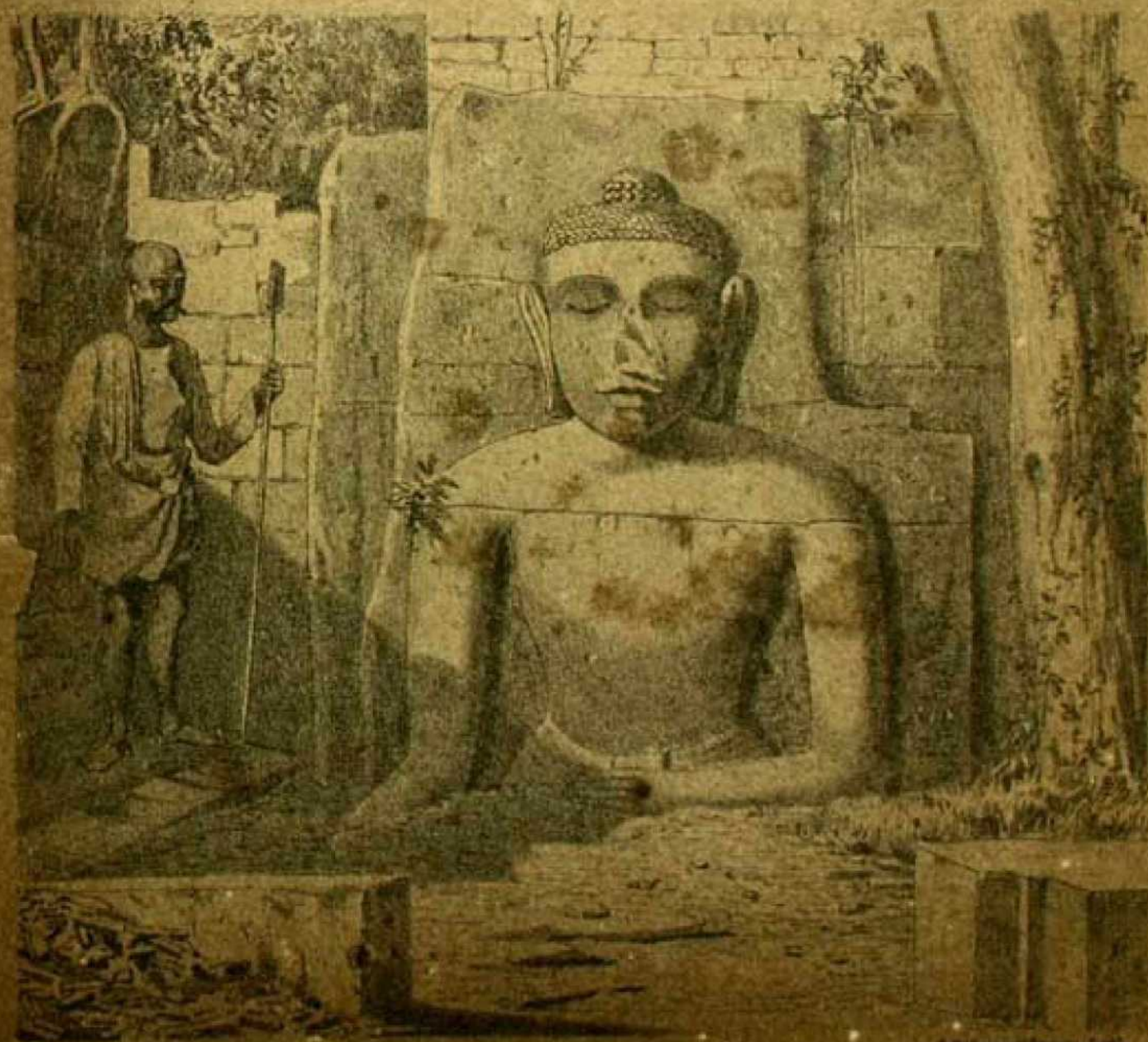
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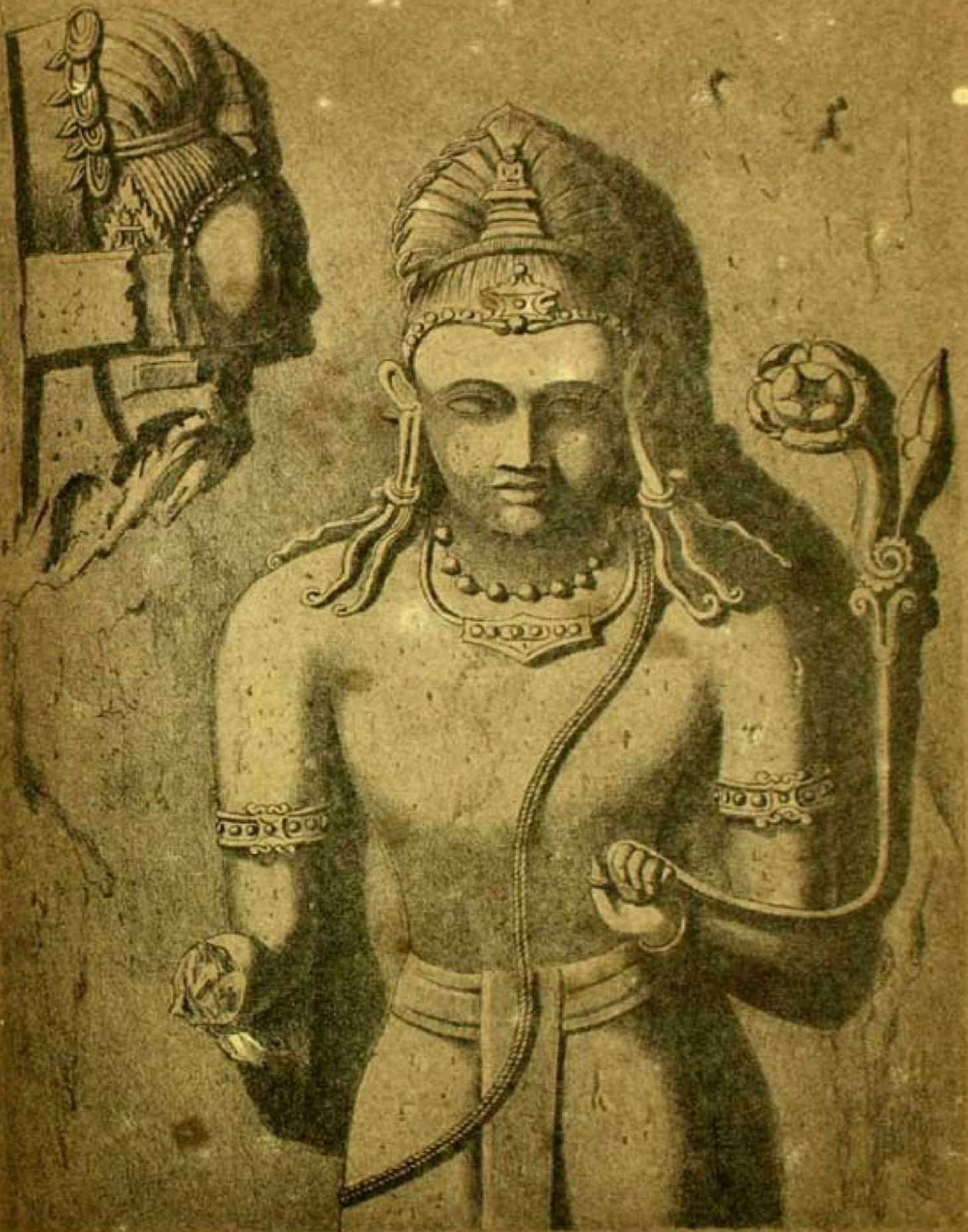
Temple of Basuli Thakurani, Naldi Gari, Cuttack.



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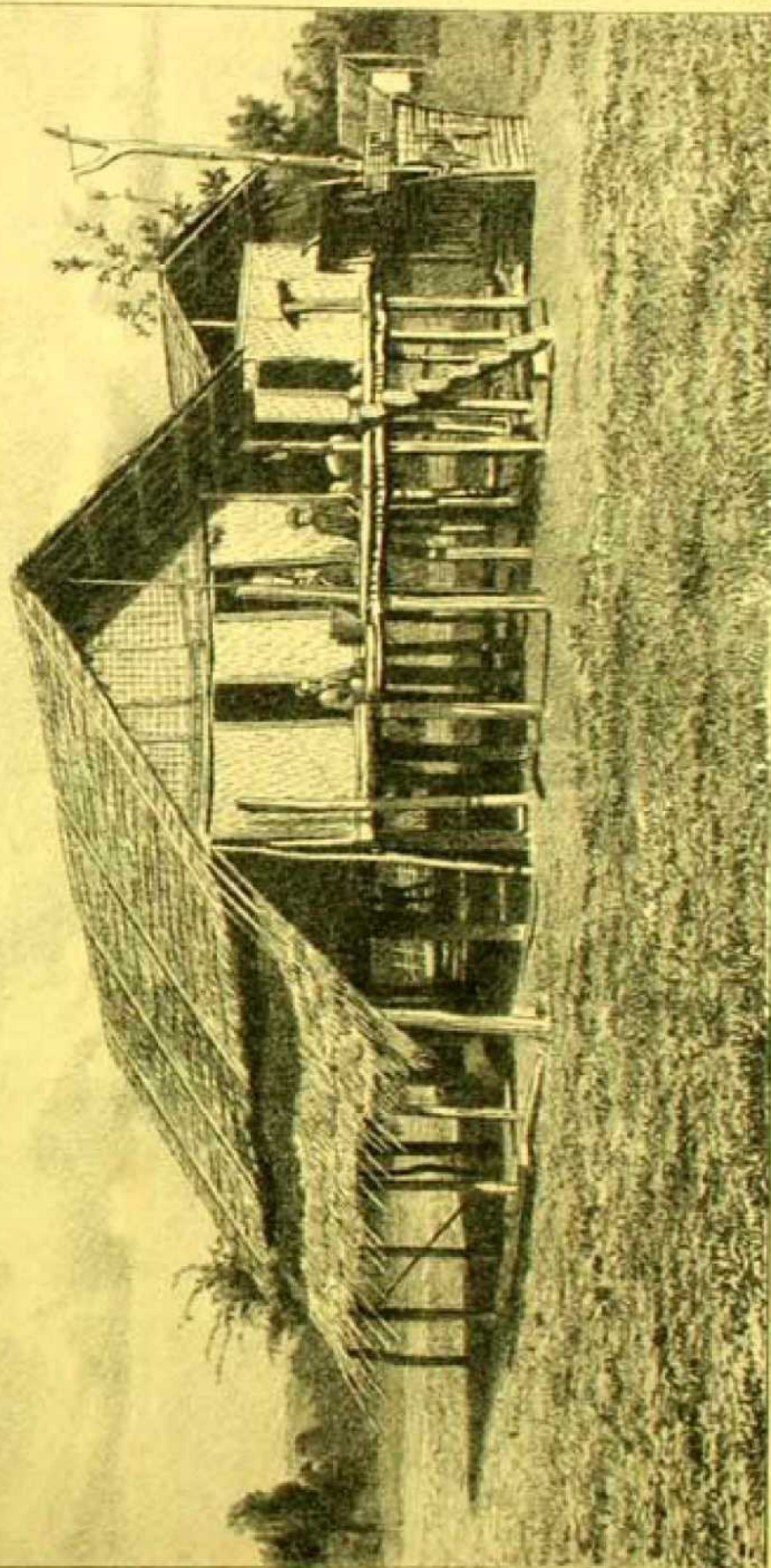
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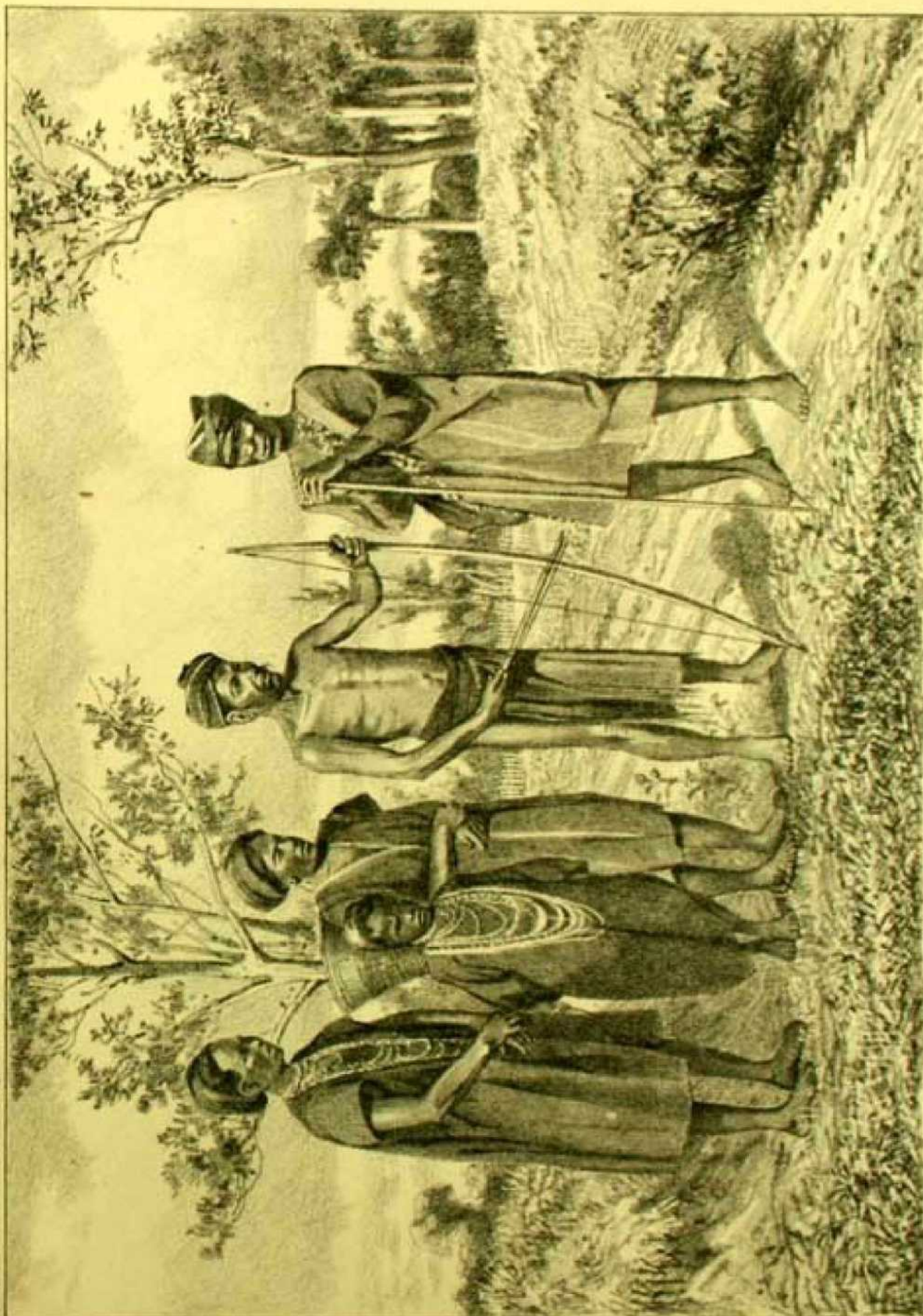
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One of the five statues of Buddha (all alike), Nalanda, and
Profile of a colossal head of Buddha, Udaya Giri, Cuttack.



J. Schauburg, Lith.

*Khyeng House, Sandoway, Arakan.
(From a photograph.)*



J. Schunbury, Lith.

Group of Khyengs, Sandoway, Arakan.
(From a photograph.)



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ERRATA.

Page 58, l. 4 from below, *for ngto read nglo*
 „ 68, l. 19, *for makhū read H. makhū*

JOURNAL

OF THE

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Part I.—HISTORY, LITERATURE, &c.

No. II.—1878.

*Pāli Studies. No. 1.—By Major G. E. FRYER, Deputy Commissioner,
British Burma.*

I.—ON THE CEYLON GRAMMARIAN SAṄHARAKKHITA THERA AND HIS TREATISE ON RHETORIC.

It was the practice amongst members of the early Buddhist church when entering the priesthood to discard their patronymic, and to adopt a priestly title, under which it was not always easy to recognize their identity. Thus it was with the subject of the present sketch, of whom nothing was known, except that he was the author of *Vuttodaya*. Another of his works, however, (*Sambandhacintā*) recently procured, has a postscript which explains that Saṅgharakkhita Thera, the 'Protected of the Congregation', was Moggallāna, the learned Pāli Grammarian and Lexicographer, who flourished in Ceylon towards the close of the twelfth century, and that he was also known as Medhaṅkara of Udumbaragiri, the glomerous fig-tree hill. Moreover, it appears elsewhere, that he was the disciple of the distinguished Sāriputta, who adopted the title Sila Thera. Moggallāna appears to have carried his literary activity with him into the cloister; for under his priestly title of Saṅgharakkhita he wrote the following treatises, of which the two first are in verse—

1. *Subodhālaṅkāra*, 'Easy Rhetoric.'
2. *Vuttodaya*, 'Exposition of Metre.'
3. *Khuddasikkhā Tikā*, a gloss in prose on Dhammasiri's *Khuddasikkhā*, 'Minor duties' (incumbent on a priest).

4. *Sambandhacintā*, 'Reflections on Relation' (of cases); a small work containing metrical maxims on construction, interspersed with comments and illustrations in prose.

An analysis of the first of these is here offered to the notice of the reader. The text which follows, has been prepared from two Pāli MSS. in the Burmese character, in the writer's possession. One—a Mandalay copy—was procured at Maulmain; the other—the more perfect of the two—came from Rangoon. The work is written on eleven palmleaves twenty inches long, with nine lines to the leaf.

Notices of *Vuttodaya*, and *Sambandhacintā*, it is hoped, will follow shortly, but as *Khuddasikkhā Tīkā* is not included in the series, the author's Introduction to it, and the postscript are here subjoined.

Introduction.

1. Tilokatilakaṃ vande saddhammāmatanimmitaṃ
samsurukkathasampatti jinaṃ janamanorammaṃ.
2. Sariputtaṃ mahasāmi 'nekasativisāraḍaṃ
mahāguṇaṃ mahāpuṇṇaṃ namo me sīrasā gururū.
3. Khuddasikkhāya tīkā yā purātanā samīritā
na tāya sakkā sakkaccaṃ attho sabbattha ñātave,
4. tato 'nekaguṇānayo manjūsāratanaṃ 'iva
Sumaṅgalo 'ssa nāmena tena paṇṇavatā sutā,
5. ajjhesito yatindena sadāraṇṇanivāsina
suvinicchayaṃ etissa karissāṃ' atthovaṇṇanaṃ.

Postscript.

yen' antatantaratanākaramanthanena
manthācalollasitaṇṇāṇavarena laddhā
'sāra matā' ti sukkhitā sukhayanti c'aṇṇe
te me jayanti guravo guravo guṇehi
"paratthasam pādanato puṇṇenādhigaten' ahaṃ
"paratthasam pādanako bhavēyyaṃ jātijātiyaṃ."
sisso āha.
paramappicchatanekasantos opasamesinaṃ
sucisallekhavuttinaṃ sadāraṇṇanivāsinaṃ;
sāsanujjotakārinaṃ averattam upāgataṃ
Udumbaragiri khyāta yatanāṃ yatipuṇḍavaṃ;
'Medhaṅkaro' iti khyātaṃ nāmadheyyaṃ tapodhanaṃ
theraṃ dhīradayāmedhaniṭhānaṃ sādhipūjitaṃ:
nissāya piyaṃ piyaṃ taṃ mittāṃ kalyāṇaṃ attano
sodhetuṃ sāsaṇaṃ satthu parakkamaṃ akāsi yo;
susaddasiddhiyo yoganicchayaṃ sabbivaṇṇitaṃ
akā Subodhālaṅkāraṃ Vuttodayaṃ anākulaṃ,

Saṅgharakkhittanāmena mahātherena dhimatā
nivāsabhutenānekagūṇānaṃ 'ppicchatādināṃ ;
tenāyaṃ racitā sādhu sāsanaodayakārīna .
Khuddasikkhāya ṭikāyaṃ Sumaṅgalapasādinī.

The couplet in *italics* commencing "*susaddasiddhi*" thus appears in the postscript to *Sambandhacintā* :

yoganicchaṃ Moggallānaṃ yaṃ gandhaṃ Kabbivaṇṇitaṃ
Subodhālaṅkāraṃ Vuttodayaṃ sattham anākulaṃ.

In other respects the postscripts are nearly the same.

Analysis.

SUBODHA'LANKA'RA, or 'Easy Rhetoric', is a metrical treatise of 370 verses, divided into five chapters which treat of the following subjects, namely :—

1. Faults in Composition.
2. Their avoidance.
3. Merits, or Verbal Ornaments.
4. Rhetorical Figures, or Ornaments of the Sense.
5. Flavour.

These subjects will be found discussed at some length in the seventh, eighth, tenth, and third chapters of the Sanskrit work on Rhetorical Composition, the *Sāhitya-Darpana* or 'Mirror of Composition', by Viś'wanātha Kavirāja—*circa* 9th or 10th century.

CHAPTERS I AND II.

The Pāli treatise in common with the Sanskrit one opens with an Invocation to the goddess of Speech thus :—

May Vāṇī the beautiful, born in the lotus womb of the mouth of the Chief of Sages, the refuge of mortals, irradiate my mind, v. 1.

The object of the work is then declared :—

Although there are excellent ancient treatises on Rhetoric by Rāma-samma and others, yet they are not adapted for the Māgadha people, v. 2.

It is, therefore, hoped the present attempt at a suitable Rhetoric may be acceptable to them, v. 3.

The author then states that he has not consulted the works of writers on the minor poems (*kabba*), nor the drama (*nāṭaka*), as they are not esteemed, v. 6. That a combination of words and meanings faultless with (merits or verbal ornaments) is composition (*bandha*), which is three-fold, being metrical (*pañña*) ; in prose (*gañña*) ; and in a mixture of both, v. 8. It is further divided into continuous composition (*niḃbandha*), and non-continuous composition (*anibandha*), each of which is pleasing if embellished with ornament, v. 9. Verbal Ornament (*Chap.* 3) and Ornament

of the Sense (*Chap. 4*), constituting the two divisions of Rhetoric, are both held to be composition (*bandha*), v. 13. Faulty composition, even when combined with Verbal Ornament, is not esteemed, v. 14. Faultless composition with Verbal Ornament is admired even without Ornaments of the Sense, v. 16.

After these prefatory remarks, the author proceeds to enumerate and explain the several Rhetorical Faults (*Chap. 1*); and to show how they should be avoided (*Chap. 2*).

The divisions of Faults (*dosa*) are held to be threefold: they occur (*a*) in a word, (*b*) in a sentence, and (*c*) in the sense of a sentence.

(*a*.) Faulty words are such as suggest an idea, which is

1. Repugnant (*viruddhatthantara*), as when a word is employed which suggests a meaning different from what is intended; as for example 'visado', which suggests *yielding poison*, when *shedding water* is the meaning intended, v. 22. The fault is avoided when the context sufficiently sets forth the intended meaning, v. 71, 72.

2. Extravagant (*adhyattha*), as when an exaggerated epithet is applied to an object which has to be particularized; as 'obhasitâsesadiso' to 'khajjoto', v. 23. The fault is avoided in the following—'if men lacking virtue fail to obtain respect, will the lack-lustre firefly illumine every spot?' v. 73.

3. Inconsistent (*kilitttha*), as when from the use of radicals, affixes and the like, comprehension of the meaning is difficult, as 'pi' in 'piya', v. 24. The fault, however, is avoided if the root is introduced into an enigmatical query, as 'from what embrace indeed will a lover not embrace happiness?' v. 74. Any word of far-fetched meaning employed in the varieties of Rhyme (*yamaka*), or Enigma (*paheli*), is included in this fault, v. 25. That euphonic combination of twin words formed of acknowledged words, combined with the merit 'Pleasing Style', is termed Rhyme, v. 26. Rhyme formed by a repetition of syllables is threefold:—(*a*) non-separated (*avyapeta*); (*b*) separated (*vyapeta*); and (*c*) both sorts combined: these divisions may appear either in the beginning, middle, or end of a quarter verse (*pāda*), v. 27. Verses 28 to 31 illustrate 'non-separate' Rhyme at the commencement of quarter verses (*avyapetapādādiyamaka*). From these examples, the 'separate' sort may easily be inferred, v. 32. Of the last named kind there are many varieties, containing combinations, both simple and complex, v. 33. But as 'Rhyme' and 'Enigma' are not altogether pleasing, they are not dwelt upon here, v. 34.

4. Contradictory, (*virodhi*) which is sixfold, in respect to:—

1. Place (*desavirodhidosa*).
2. Time (*kālavirodhi*).
3. Mechanical art (*kalāvirodhi*).
4. Nature (*lokavirodhi*).

5. Propriety (*ñāyavirodhi*).

6. The sacred books (*āgamavirodhi*), vv. 35, 76 to 81.

5. Inferred (*neyya*). The use of the word 'dhavala' *white*, in the example, leads to the inference, that the whiteness at night spoken of, arose from the moon, v. 36. This fault is universally condemned by poets, as the omission of an exponent word renders the meaning obscure, v. 37. The fault is avoided by the employment of words, which convey their meaning immediately, as in the examples given in vv. 82, 83, which also exemplify the 'Lucid Style', v. 148.

6. Dependent on an epithet (*vises anāpekkha*), as in the example 'he beholds him attentively with eyes', v. 38, where 'cakkhunā' is unqualified. The fault is removed by adding 'kodhapāṭalabhutena', red with anger. (Comp. v. 364.)

7. Defective in meaning (*hīnaltha*), as when an unequal and disparaging comparison is made; as 'the dim-firefly sun is rising', v. 39. The fault is avoided by the use of the emphatic particle 'api' *even*, as in the following 'A wise man destroys the effect of *even* the smallest demerit; The sun possesses the light *even* of the dimly lustrous firefly', v. 85.

8. Unmeaning (*anatta*), as when an unmeaning expletive, such as 'pi' here, is inserted merely to complete the verse, v. 40; verse 86 shows how the fault may be avoided.

(b.) Faulty sentences are such as are

1. Tautological (*ekattha*). The repetition may be (a) of a word, as 'vārido vārido' possessing the same sound, though different in meaning, v. 41; or (b) of the sense, as 'pasādeti and pasanno' having the same sense, but different in sound, v. 42. If it is desired to express fear, anger, or praise, repetition ceases to be a fault, v. 88.

2. Regardless of usage (*bhaggarīti*), as when the diction is broken, v. 43. In the example given, 'pakati' has no interrogative pronoun connected with it, as 'paññā and guṇo' have. The fault is corrected in verse 89.

3. Confused (*vyākiṇṇa*—), as when confusion arises from a loose disorderly arrangement of words as 'these people * * adore Sugata, the constant friend of evildoers', v. 45. The opposite of this is a firm and compact style, as 'the eyes (of a Jina) are like blue lotuses, his lip beautiful as the *Bandhūka* flower; his nose like a golden hook, therefore this Jina is as one who looks kindly on every one (Piyadassana). v. 91.

4. Rustic (*gamma*), as when a word denoting speciality is wanting in a sentence, as—'Oh maiden! loving me, why not love me now', v. 46; or when, from the association of the words, the sense is obscure as 'which your lover?', v. 47. Brilliancy of language, though coarse, from the pleasure it imparts, is not considered rustic speech; as 'Oh kind (husband)!

this rough amorous outcast is ill-treating me, why dost thou so complacently regard me involved in such a misfortune?' v. 93.

5. Defective as regards verse-division (*yatihīna*). Verse-division as laid down in Prosody, and indicated in the text (verses 49 to 54), is called '*yati*'; and the verse that is defective in regard to such division, is said to exhibit the fault called *yatihīnadosa*, v. 48. Verse-division occurs at the end of every quarter-verse (*pāda*); and particularly at the end of the hemistich (*vuttadḍha*); sometimes it bisects a word as '*camikara*', but if otherwise, as when it occurs between the second and third syllables of '*siñcati*', it is irregular, vv. 49, 50. If the rules for the euphonic junction of final and initial letters (*Sandhi*) require the elision of a case, or tense-termination (*vibhatti*), the vowel resulting from the coalition is the final letter of the first part of the combination, as *sabbo|pama*: if elision is not required, or there is a letter such as '*y*' substituted, the case, or tense termination, with the vowel resulting from the coalition, forms the initial syllable of the second part of the combination; as for example in '*pattalssopamā*', and '*vandā|myan antamatip*', v. 53, 54. Verse-division is irregular when it separates '*ca*' and such like particles from the sentences to which they belong, and '*pa*', and such like prepositions, from the words to which they are prefixed, v. 54 and 55.

6. Disjoined (*kamaccuta*), as when the proper succession of objects is disregarded, as '*khettaṃ, gāmaṃ, desaṃ*', v. 56. For the proper order see v. 95.

7. Inappropriate (*ativutta*), as when the meaning is opposed to ordinary sense, as—'The firmament of her expanding bosom is contracted', v. 57. The fault is avoided in the following—'The entire firmament even affords no scope for the diffusion of the glorious effulgence, emitted by the moon-like Chief of Sages', v. 96, v. 147.

8. Redundant in meaning (*opetatta*), as in the expression 'The bull, the son of the cow', v. 58. Redundancy is not deemed a fault in the words of the insane, v. 97, 98.

9. Harsh in combination (*bandhapharusa*). This is exemplified by the use of the consonant '*kh*' in syllables which renders them harsh in sound, v. 59. The fault is avoided by using soft syllables, v. 99, and 136.

(c.) The sense of a sentence is held to be faulty when it is

1. Crude (*apakkama*), as when objects which refer to other objects previously stated, are not in respective co-relation, *e. g.* in v. 61 'wealth, peace, and Nibbāna'—instead of 'Nibbāna, wealth, and peace', in v. 101—are placed respectively in co-relation to the practice of 'meditation, giving of alms, and virtue.'

2. The improper (*ocityahīna*), as when extolling one's own merits, &c., v.v. 62, 63. The fault is avoided if by doing so others are benefited, v. 104—107.

3. Faulty as to usage (*bhaggarīti*), as when cases are mixed together, such as the genitive and locative cases in v. 64. 'Trust cannot be placed in women, evildoers, poison, horned cattle, rivers, disease, nor royalty', v.v. 109, 110.

4. Ambiguous (*samsaya*), as when a word susceptible of two meanings is employed; as 'go', which signifies both 'a cow' and 'a ray of light', v. 65, and 111. Ambiguity in jocular composition is not reckoned a fault, v. 112.

5. Rustic (*gamma*), as when it is difficult to comprehend what is meant by the sense; as—'This vigorous youth is reposing—*having slain his enemy*, or—*exhausted from excesses*', v. 66. 'That man's sister is charming' is not a rustic expression, v. 114.

6. Faulty as to Rhetoric (*duṭṭhāṅkāra*). This fault is discussed in chapter 4.

CHAPTER III.

In this chapter are described the Merits, or Excellences (*guṇa*), of composition, which are ten in number, namely:

1. The pleasing (*pasāda*).
2. The forcible (*oja*).
3. The elegant (*madhuratā*).
4. The uniform (*samatā*).
5. The soft (*sukhumālatā*).
6. The compact (*silesa*).
7. The eloquent (*udāratā*).
8. The bright (*kantī*).
9. The lucid (*alṭhavyatti*).
10. The imaginative (*samādhi*), v. 118.

A compact pleasing style, composed of words whose meaning is clear, constitutes the *Pleasing Merit*, v. 120.

The merit of *Force* is Energy manifested by an ample use of compounds, v. 122, and by condensation (*samāsa*), and amplification (*vyāsa*) of the meaning, v. 224.

The *Elegant* style is manifested either by an arrangement of words with letters pronounced by the same organ of speech, v. 129; or, of words having similar letters, v. 130. A collection of syllables pronounced with little effort, dependent upon a profusion of alliteration, is inelegant, v. 131.

The merit of *Uniformity* is manifested when the composition is either smooth, or rough, or a mixture of both, v. 132.

An absence of jarring letters constitutes the merit of *Softness*, v. 136.

The merit of *Compactness* is manifested by a clear and firm style, v. 141.

The merit of *Eloquence* is indicated by a lofty style, v. 143.

The *Bright* style is manifested by a brilliancy of language, free from the fault of Inappropriateness, v. 147.

Words which convey their meaning immediately, constitute the *Lucid* style, v. 148.

The *Imaginative* style is held to be the 'cream of composition'. It is manifested when the imagination clothes objects with qualities or functions foreign to them, as when

1. Life is ascribed to inanimate objects.
2. Form to objects unassociated with form.
3. Flavour to objects unassociated with flavour.
4. Liquidity to objects not bearing that character.
5. Agency to an object not an agent.
6. Solidity to an ethereal object, vv. 152-153.

When allegories which suggest the idea of emitting, are the leading ideas in a sentence, they are considered coarse; in a subordinate position, they are appropriate, v. 160; and especially so, if connected with a conscious agent, v. 162, as 'The excellent Jina pouring out the yearnings of his love upon mortals,' &c., 163.

CHAPTER IV.

In this chapter the author proceeds to describe the several Ornaments of the sense (*atthālaṅkāra*). He says that when composition containing the qualities of the Pleasing, Forceful, or other styles, is embellished with Ornaments of the Sense, it is as charming as a girl adorned with bracelets, earrings, and the like, v. 165.

He divides Rhetoric into (*a*) style in which the meaning is 'expressed', *sabhāravutti*; and (*b*) style in which the meaning is 'suggested', *vaṅgavutti*. The first of these portrays, at different times, objects (such as a genus, a quality, an action, or a substance), v. 166.

The following is an *expressed* fancy of a substance (*dabbasabhāravutti*):—

'The nascent Bodhisatta, charming in his joyous gait, steadfastly regarding the regions of existence, is radiant while uttering taurine words', v. 167.

As the varieties of the *suggestive* or *figurative* style are endless, only elementary figures will be described, v. 168 to 172.

1. Hyperbole (*atisayavutti*). This figure discloses the peculiar attribute of an object (whether a genus, a quality, an action, or a substance). It is twofold:—

- (*a*.) Respecting mundane objects (*lokiyātisayavutti*).
- (*b*.) Respecting supermundane objects (*lokātikkanta*), v. 174.

2. Simile (*upamā*) is resemblance between the subject of comparison and the comparison adduced; this may be conveyed either (a) by a word, (b) by the sense, or (c) by the sense of a sentence, v. 177; or by the use of a compound word, as '*candimānana*', v. 178; or a verbal affix, as '*āya*' in '*vadanam paṇkajāyate*', v. 179; or by the use of words implying comparison as-*wa*, *tulyā*, and the like, v. 180-185.

(a.) Similes formed by words implying comparison are the

1. Correct (*dhammopamā*), v. 187.
2. Defective (*dhammahīno*),
3. Reversed (*viparito*), } v. 188.
4. Reciprocal (*aññamañña*), v. 189.
5. Marvellous (*abbhuto*), v. 190.
6. Equivocal (*silesa*), v. 191.
7. Spreading (*santāno*), v. 192.
8. Disparaging (*nindo*), v. 198.
9. Prohibitive (*paṭisedho*), v. 194.
10. Uncommon (*asādhāraṇa*), v. 195.
11. False (*abhuto*), v. 196.

(b.) In the following similes, the idea of similarity is conveyed by a word's meaning, without the employment of a compound, verbal affix, or word implying comparison, v. 199. They are the

1. Obvious (*sarūpopamā*), v. 198.
2. Ideal (*parikappo*), v. 199,
3. Doubtful (*samsayo*), v. 200.
4. Typically comparative (*paṭivatthū*), v. 201.

(c.) The third form of simile is expressed by setting the sense of one sentence in comparison with that of another, v. 203; and this may be done, either with, or without, employing words implying comparison, vv. 204, 205.

Sometimes the following kinds of similes are deemed incongruous—

1. Comparison between objects of different genders (*bhinnalingo*) and of different numbers (*vi jātivacano*), v. 207.
2. The defective simile (*hīno*), v. 207.
3. The exaggerated (*adhiko*),
4. The irrelevant (*apuṭhattha*), } v. 208.
5. The contingent (*apekkhinī*), } v. 209.
6. The imperfect (*khaṇḍito*), }

Sometimes the above are not deemed incongruous, vv. 211 and 212.

3. Metaphor (*rūpakam*). This figure indicates the resemblance between the subject of comparison and the comparison adduced, but, unlike the simile, without employing words implying comparison. It has two divisions, namely:—

(a.) general (*asesavatthuvīsaya*), v. 214-217.

(b.) partial (*ekadesavivatti*), v. 218-221.

each of which may be exhibited by means of compounded words, or words not compounded, or both combined, v. 214. The author says the varieties of metaphor, both proper and improper, are too numerous to be dwelt upon here, v. 222. Subjoined is a specimen of a *proper* metaphor:—

‘Oh Sage! whose heart indeed is not drawn to thy attractive countenance, bright as white flowers, with tremulous black bee eyes?’ v. 223.

The following are examples respectively of (a) imperfect (*khaṇḍitarūpakam*), and (b) perfect (*sundararūpakam*), metaphors, v. 224—

(a) ‘candim’ ākasapadumam’, the lotus rising in the heavens is the moon.

(b) ‘ambhoruhavanam nettani’, eyes which are a cluster of water-lilies.

4. Redundancy (*āvutti*). The repetition may be threefold, v. 226, namely as regards

(a.) the sense (*atthāvutti*), v. 227.

(b.) a word (*padāvutti*), v. 228.

(c.) or both (*ubhayāvutti*), v. 229.

5. The Illuminator (*dīpakam*). The figure is manifested when things, such as actions, kinds, or qualities, although expressed in one part of a sentence, illuminate the whole of it, v. 230; and it has three varieties, arising from the action, kind, or quality, being expressed in the sentence at the

(a.) beginning (*ādidīpakam*), v. 231.

(b.) middle (*majjha—*), v. 232.

(c.) end (*anta—*), v. 233.

If a series (of actions, kinds, or qualities) is exhibited in succession, each one being dependent on the one preceding, the figure is termed ‘a string of Illuminators’ (*māladīpakam*), vv. 234, 235.

6. Hint (*ākkhepo*), when it is intended to say something special, that which apparently suppresses or denies it, is termed Hint, v. 237. It is threefold, pertaining to what

(a.) has been said (*atitākkhepo*), v. 238.

(b.) as being said (*vattamānākkhepo*), v. 239.

(c.) is about to be said (*anāgatākkhepo*), v. 240.

7. Transition, (*atthantaranyāsa*) is the introduction of another sense into the subject (such as a moral reflection), v. 241. It is twofold, namely:—

(a.) general (*sabbavyāpi—*), v. 242, 243.

(b.) partial (*visesatha—*), v. 244, 245.

each kind being distinguished by the absence and presence of the emphatic particle ‘*nī*’.

8. Contrast, (*vyatireko*) is the distinction in the idea of resemblance between objects either expressed or understood, v. 246. It is twofold, namely:—

(a.) single (*ekavyatireko*), v. 246, 248.

(b.) double (*ubhaya*—), v. 249, 250.

9. Peculiar causation, (*vibhāvanā*) is the production of an effect by some cause other than the usual one, which is suppressed; or, (the production of an effect) naturally, (though dependent upon some other cause); v. 251. Hence the figure is twofold, namely:—

(a.) peculiar (*kāraṇantara*), v. 252.

(b.) natural (*sabhavikaphala*), v. 253.

10. Causation (*hetu*). This figure has two divisions, namely—

(a.) producing causation (*janakahetu*).

(b.) indicating causation (*ñāpakahetu*), v. 254.

A few only of the endless subdivisions of the above are indicated in this treatise. They are: v. 235.

(a.) active causation producing apparent act (*bhāvakiṇṇo kārahetu*), v. 256.

(b.) active causation producing non-apparent act (*abhāvakiṇṇo kārahetu*), v. 257.

(c.) causation indicating apparent act, (*bhāvakiṇṇo ñāpakahetu*), v. 258.

(d.) unfitly acting wonderful causation (*ayuttakāri cittahetu*), v. 259.

(e.) fitly acting wonderful causation (*yuttakāricittahetu*), v. 260.

11. Order (*kamo*), is when a reference is made respectively to what has been mentioned, v. 261. This figure is the Relative Order (*yathāsaṅkhyā*) of Sanskrit Rhetoric.

12. Excessively agreeable (*piyataraṃ*). This figure is exhibited when an excess of agreeability is imparted to the sense, v. 263, 264.

13. Concise style, (*samāsavutti*) is exhibited, when an intended object is concisely described by means of an approved metaphor, v. 265. It is twofold, namely, when the attributes are either

(a.) separate (*bhinnavisesana*), v. 266.

(b.) non-separate (*abhinnavisesana*), v. 267, 268.

14. Idealization, (*parikappana*) is the imagining of an object under the character of another, v. 270. This figure is expressed by an implied metaphor, and may depict actions, qualities, and the like, v. 271. Such expressions as 'methinks, I suspect, of a certainty, surely, as,' are occasionally made use of in this figure, v. 275.

15. Concentration, (*samāhita*) is manifested when a special consequence results from a concentrated effort, v. 277.

16. Periphrasis, (*pariyāya*) is when the fact to be intimated, is ex-

pressed in a roundabout way, so as to avoid a common expression, v. 279.

17. Ironical praise, (*vyājavāṇṇana*) is commendation conveyed in language which is apparently ironical, v. 281.

18. Peculiar allegation, (*visesa*) is when a special cause is acknowledged, there is an absence of effect, whether in regard to a substance, an action, a genus, or a quality, v. 283.

19. Individuality, (*rūlhāhankāra*) is when arrogance is prominent in a marked degree, vv. 288, 289.

20. Coalescence or Paronomasia, (*silesa*) is when words are so connected as to be susceptible of a double meaning, v. 290. The figure is held to minister to the heightening of suggestive style, v. 173. It is threefold, namely—

(a.) without division (*abhinnapadavākya silesa*), v. 291.

(b.) with division (*bhinnapadavākya*), v. 292.

(c.) both sorts combined (*bhinnābhinnapadavākya*), v. 293.

There are also the following eight varieties, v. 294, 295—

1. Repugnant action (*viruddhakammasilesa*), v. 296.

2. Non-repugnant action (*aviruddha-kamma*), v. 297.

3. Non-separate action (*abhinna-kamma*), v. 298.

4. The emphatic (*niyamavā*), v. 299.

5. The non-emphatic (*niyamakkhepa*), v. 300.

6. The non-contradictory (*avirodhi*), v. 301.

7. The contradictory (*virodhi*), v. 302.

8. The polite (*ocityasamposaka*), v. 303.

21. Equal pairing, (*tulyayogitā*) is when objects possessing attributes are associated with one and the same attribute, v. 304.

22. Illustration, (*nidassanaṃ*) is when from the introduction of a foreign relation, a mutual connection ensues; and it is twofold, v. 306, namely—

(a.) non-possible (*asantam*), v. 307.

(b.) possible (*santam*), v. 308.

23. Magniloquence, (*mahantatthap*) is when grandeur in position or in resolve is indicated in a marked degree, 309-311.

24. Concealment, (*vañcanā*) is when the real nature of a thing is kept back, and another fancied one attributed, which may be either, v. 312,

(a.) dissimilar (*asama—*), v. 313.

(b.) similar (*sama—*), v. 314.

25. Indirect praise, (*oppakatathuti*) is when trifling praise is bestowed upon an insignificant object, v. 315.

26. The Necklace, (*ekāvali*) is when what is mentioned first, is qualified by what follows, and this again by what comes next, and so on, v. 317. It is twofold—

(a.) affirmative (*vidhi*—), v. 318.

(b.) negative (*nisedha*—), v. 319.

27. The Reciprocal, (*aññamaññam*) is when two things do the same act to each other, vv. 320, 321.

28. Connected description, (*sahavutti*) is when different ideas are connected with the word 'saha'. It is twofold—

(a.) of actions (*kriya*), v. 323.

(b.) of qualities (*guṇā*), v. 324.

29. Contradiction, (*virodhitā*) is when there is an apparent incongruity among things, such as a genus, quality, action, and substance, v. 325.

30. The Return, (*parivutti*) is the exchange of a thing for what is peculiarly excellent, v. 329.

31. Error, (*bhamo*) is the thinking, from resemblance, of an object to be what it is not, v. 329.

32. Emotion, (*bhāvo*) is when the style awakens sentiment in the minds of poets, v. 331. This figure is considered the life of poetry, v. 173.

33. Mixture, (*missam*) is when verbal ornaments and ornaments of the sense are blended together, v. 333. The figure is twofold :—

(a.) existence of intimate relation (*angānibhāva*—), v. 334.

(b.) existence of same effect (*sadisaphalabhāva*—), v. 335.

34. Prayer, (*āsi*) is prayer for any desired object, v. 336.

35. The Impassioned, (*rasi*) is when the style is full of feeling and witty, vv. 337, 338.

CHAPTER V.

The fifth and last Chapter treats of Flavour (*rasa*). Such conditions (*bhava*), excitants (*vibhāva*), and ensuants (*anubhāva*), as are mainsentiments in composition, are held to be the several Flavours of poets, v. 341.

Since the various conditions, or states of the mind, give occasion for the existence of (*bhāvāyanti*) the flavours, they (such as love, mirth, and the like) are termed conditions or mental states (*bhāva*), v. 342.

That condition, or mental state, such as love and the like, which is not overpowered by another condition opposed to it, such as disgust and the like, is held to be 'the permanent condition' (*thāyi-bhāva*), v. 343. They are nine in number, namely :—

- | | |
|------------------------------------|---------------------------------|
| 1. love, <i>rati</i> . | 5. magnanimity, <i>ussaka</i> . |
| 2. mirth, <i>haso</i> . | 6. terror, <i>bhayam</i> . |
| 3. sorrow, <i>soko</i> . | 7. disgust, <i>jigucchā</i> . |
| 4. resentment, <i>kodho</i> . | 8. surprise, <i>vimhaya</i> . |
| 9. quietism, <i>samo</i> , v. 344. | |

The Accessories (*vyabhicāri*) are those that more especially, cooperatively, habitually go along with the various conditions (*bhāva*) and excitants (*vibhāva*), v. 345. They are thirty-three in number, namely :—

- | | |
|---|--|
| 1. Self-disparagement, <i>nibbēda</i> . | 18. Dissembling, <i>avahiddhā</i> . |
| 2. Debate, <i>takka</i> . | 19. Painful reflection, <i>cintā</i> . |
| 3. Apprehension, <i>sankā</i> . | 20. Arrogance, <i>gabbha</i> . |
| 4. Weariness, <i>sama</i> . | 21. Dementedness, <i>apamāra</i> . |
| 5. Equanimity, <i>dhiti</i> . | 22. Impatience of opposition, <i>amarisa</i> . |
| 6. Stupefaction, <i>jalatā</i> . | 23. Intoxication, <i>mada</i> . |
| 7. Depression, <i>dīnatā</i> . | 24. Resolve, <i>mati</i> . |
| 8. Sternness, <i>uggatā</i> . | 25. Raving, <i>ummada</i> . |
| 9. Indolence, <i>ālasatta</i> . | 26. Distraction, <i>moha</i> . |
| 10. Dreaming, <i>suttaṃ</i> . | 27. Awakening, <i>vibodha</i> . |
| 11. Joy, <i>hāsa</i> . | 28. Drowsiness, <i>niddā</i> . |
| 12. Debility, <i>galāni</i> . | 29. Cessation of motion, <i>āvega</i> . |
| 13. Longing, <i>ussuka</i> . | 30. Shame, <i>vilāpa</i> . |
| 14. Alarm, <i>tarasa</i> . | 31. Death, <i>maraṇa</i> . |
| 15. Recollection, <i>sati</i> . | 32. Unsteadiness, <i>capalā</i> . |
| 16. Envy, <i>assā</i> . | 33. Sickness, <i>vyādhī</i> , v. 346. |
| 17. Despondency, <i>visāda</i> . | |

The power of fixing the mind on one subject is purity, *sattam*; from this arises the involuntary evidences of feeling which are states of mind different from the ensuants in general, v. 347. They are eight in number v. 348, namely :—

- | | |
|------------------------------------|---|
| 1. Paralysis, <i>thambha</i> . | 5. Tears, <i>assu</i> . |
| 2. Fainting, <i>palaya</i> . | 6. Trembling, <i>vepathu</i> . |
| 3. Horripilation, <i>romaṇca</i> . | 7. Change of colour, <i>vevaṇṇiyam</i> . |
| 4. Perspiration, <i>seda</i> . | 8. Disturbance of speech, <i>visaratā</i> . |

The mental conditions, such as love and the like, if they are not inseparably permanent, may all serve as Accessories, v. 349.

That thing which causes the awakening (*uppatti*), and inflaming (*uddīpana*) of these (the 'permanent, accessory, and involuntary' conditions), is called an Excitant, (*vibhāva*); and that which manifests externally (that those conditions are excited) is called an Ensuant, or Effect (*anubhāva*), v. 350.

Excitants and Ensuant are appropriately displayed in poetry, in order to exhibit the conditions and various emotions of the mind, v. 351.

The conditions, permanent, accessory, or involuntary, are appropriately represented by the Excitants and Ensuant, v. 351.

The involuntary evidences of strong feeling (*sattika*), arising in the mind from its various states, and manifested by ensuants or effects; such as perspiration exuding from the body, and the like, v. 353.

That is 'Flavour' which in poetry excites the joy of the audience, v. 354. The flavour which conduces to a state of relish by means of excitants, ensuants, involuntary evidences, and accessories, is held to be a permanent one, v. 355. The divisions of flavour are, v. 356—

- | | |
|-----------------------------------|---------------------------------------|
| 1. the Erotic, <i>singāra</i> . | 5. the Heroic, <i>vīra</i> . |
| 2. the Comic, <i>hassa</i> . | 6. the Terrible, <i>bhayanakā</i> . |
| 3. the Pathetic, <i>karuṇā</i> . | 7. the Disgustful, <i>bibhaccha</i> . |
| 4. the Furious, <i>ruddha</i> . | 8. the Marvellous, <i>abbhuta</i> . |
| 9. the Quietistic, <i>santa</i> . | |

By the 'Erotic' is meant the flavour which has love for its condition, the intoxicating pleasure arising from the mutual affections of youths and maidens, &c., &c., v. 358. It is threefold, (a) incompatible, (b) partial, and (c) mutual, v. 359.

The 'Comic' may arise from the fun of distorted gestures pertaining to oneself or to another; the accessories are drowsiness, weariness, indolence, fainting, and the like. Its condition is mirth, which belongs chiefly to rational beings, v. 360. When under the influence of the 'Comic', the best kind of persons either slightly smile (*sita*), having the eyes a little open; or smile (*hasita*), slightly showing the teeth; the middling sort either laugh softly (*vihasita*), or laugh aloud (*upahasita*); the baser sort either roar with laughter (*apahasita*), with eyes filled with tears, or are convulsed with laughter (*atihāsita*), with limbs uncontrolled, v. v. 361, 362.

The 'Pathetic' with the mood of sorrow, springs from the advent of what is unpleasant, and absence of (loved) objects. Its 'ensuants' are weeping, fainting, stupefaction, &c. Its accessories are despondency, indolence, death, painful reflection, &c., v. 363.

The 'Furious' accompanied by anger, envy, and the like, is marked by redness of the eyes, &c., has terror and intoxication, &c., for its accessories, v. 364.

The 'Heroic', associated with energy, arises by glorious victory and the like. It is threefold:—(a) Heroic in war; (b) Heroic in liberty; and (c) Heroic in benevolence, which are its 'ensuants': its accessories are equanimity, resolve, &c., vv. 365, 366.

The 'Terrible' has fear for its permanent mood; its ensuants are perspiration, &c. Its accessories, terror, &c., v. 367.

The 'Disgustful', associated with disgust, arises from aversion to putridity, and the like; its 'ensuants' are contracting of the nose, &c.; its accessories, apprehension, and the like, v. 368.

The 'Marvellous' having surprise as its permanent mood, springs from anything supernatural; its 'ensuants' are perspiration, tears, &c.; its accessories, terror, cessation of motion, stupefaction, v. 369.

The 'Quietistic', or the mood of the very best men, has calmness for its permanent mood, and kindness, mercy, and joy, as its accessories, v. 370.

With the exceptions noted below, the metre employed by the author is the 'Vatta', said to be like the Sanskrit *s'loka*.

In closing the first four chapters, and in illustrating (v. 338) the 'Impassioned' figure of Rhetoric, he has adopted the Vasantatilakā Metre.

In the fifth chapter he has employed the Saddharā Metre of 21 syllables, to enumerate the thirty-three 'accessories', v. 346. In describing the kinds of laughter provoked by the 'Comic' flavour, he has used the melodious rhythms of the 'Arya', v. 361, and the mixed 'Mattāsamakā' (padākulakam), v. 362.

I have met with no commentaries on the work. There is, however, a gloss (*ṭikā*), which is said to be scarce.

TEXT.

NAMO TASSA BHAGAVATO ARAHATO SAMMA SAMBUDDHASSA.

1. munindavadanamambojagabhasambhavasundarī
saraṇaṃ paṇinaṃ Vāṇī mayhaṃ pipayataṃ manam.
2. Rāma-Sammādyalaṅkāra santi santo purātanā
tathāpi tu valaṅcenti suddhamāgadhikā na te.
3. tenāpi nāma toseyyam ete 'laṅkāra vajjite
anurūpen' alaṅkāren' esam eso parissamo.
4. yesan na saṅcitā paṇṇā 'nekasattantarocitā
samohabbhāhatā 'v' ete nāvabujjhanti kiṅcepi.
5. kin tehi pāda-sussūsā yesan natthi gurūn' iha
ye ta-ppāda-rajo-kiṇṇā t'eva sādhu vivekino.
6. kabba-nāṭaka-nikkhita netta cittā kavi-jjanā
yaṃ kiṅce racayant' etaṃ na vimhaya-karaṃ paraṃ.
7. te yeva paṭibhāvanto so 'va bandho savimhaya
yena tosentī viññū ye tattha pyavīhit' ādharā.
8. bandho ca nāma sadd-atthā sahitā dosa-vajjitā
pajja-gajja-vimissānaṃ bhedenāyaṃ tidhā bhava.
9. nibandho cānibandho ca puna dvidhā niruppate
tan tu pāpentyalaṅkāra vindaniyatarattaṇaṃ.
10. anavajjaṃ mukhambhojaṃ anavajjā ca bhārati
alaṅkatā 'va sobhante kin nu te niralaṅkatā.
11. vinā gurūpadesaṃ taṃ bālo 'laṅkatthum icchati
sampaṇṇe na viññūhi hasa-bhāvaṃ kathaṃ nu so.

12. gandho pi kavi-vácānam alaṅkāra-ppakāsako
yāti ta-bbacanīyattham ta-bbohārúpacārato.
13. dvi-ppakārā alaṅkāro tattha saddatthabhedato
saddatthā bandhanāmā 'va tam sajjita tad āvaḷi.
14. guṇālaṅkāra-samyuttā api dosā 'va liṅgitā
pasamsiyā na viññūhi sā kaṇṇā viya tādisi.
15. tena dosa-nirāso 'va mahussāhena sādhiyo
niddosā sabbatthā sāyam saguṇā na bhavyeṇa kim.
16. sālaṅkāra viyuttāpi guṇa-yuttā manoharā
niddosā dosa-rahitā guṇa-yuttā vadhū viya.
17. pade vākye tad atthe ca dosā ye vividhā matā
sodāharanam etesaṃ lakkhaṇam kathayāmyaṃham.
18. viruddhatthantarādhyattha, kilīṭṭhāni, virodhi ca,
neyyam, visesanāpekkham, hīnatthakam, anatthakam.
19. dosaṃ padānaṃ vākyānam, ekattham, bhaggarītikam,
tathā vyākīṇṇa, gamāni, yatihīnaṃ, kamaccutaṃ.
20. ativuttam, apetattham, sabandhapharusam tathā
21. apakkamam, ocityahīnaṃ, bhaggarīti, samsayam,
gammam, duṭṭhālaṅkatīti dosā vākyattha nissitā.
22. viruddhatthantaram tam hi yass' aññattho virujjhati
adhippete yathā : "megho visado sukhaye janam."
23. visesyam adhikam yenādhyattham etaṃ bhavye yathā :
"obhāsītāsesadiso khajjoto 'yam virojate."
24. yass' atthāvagamo dukkho pakatyādivibhāgato
kilīṭṭham tam yathā : "tāya so 'yam ālingyate piyā."
25. yam kilīṭṭham padaṃ mandābhidheyyam yamakādikaṃ
kilīṭṭhapadadose 'va tam pi antokariyati.
26. paṭītasaddaracitaṃ silīṭṭhapadasandhikaṃ
pasādaguṇasamyuttaṃ yamakam matam edisaṃ
27. avyapetaṃ vyapetañ c' aññ' āvuttāneka-vaggaṇaṃ
yamakam tañ ca pādānaṃ ādi-majjhanta-gocaraṃ
28. sujanāsujanā sabbe guṇenāpi vivekino
vivekam na samāyanti aviveki janantike
29. kusalākusalā sabbe pabalāpabalā 'tha vā
no yātā tāvāhosittham sukha dukkha-ppadā siyup.
30. sādara sā darap bantu vihitā vihitā mayā
vandanā vandanāmāna-bhājane-ratanatthaye,
31. kamalam kam alamkatthum, vanado vanado 'mbaram,
sugato sugato lokam, sahitaṃ sahitaṃ karam.
32. avyapetādi yamakass' eso leso nidassito
ñeyyān' imāy' eva disāy' aññāni yamakāni pi.
33. accantabahavo tesam bheda sambheda-yoniso

- tattha pi keci sukará keci accantadukkará.
34. yamakam tam paheḷi ca n'ekantamadhurán' iti upekkhiyanti sabbáni sissakhedabhayá mayá.
35. desa-kála-kalá-loka-'nāy'-ágama-virodhi yam tam virodhi padañ c'etam udāharanato puṭam.
36. yad appatitam ániya vattabbam neyyam áhu tam yathá : "sabbápi dhavalá disá rocanti rattiyam."
37. n'edisam bahu maññanti sabbē sabbattha viññuno dullabhá 'vagati sadda-sámattiya-vilañghani.
38. siyá visesanāpekkham tam yam patvá visesanam sattakam tam yathá : "tam so bhiyyo passati cakkhuná."
39. hinam kare visesya yam ti hinattham bhava yathá :—
"nippabhá-kata-khajjoto samudeti divákaro."
40. páda-púranam attham yam anattam iti tam matam yathá ti—"vande buddhassa páda-pañkeruham pi ca"
41. saddato atthato vattam yattha bhiyyo' pi v-uccati tam ekattham yathá :—"bháti várido várido ayam."
42. yathá ca :—
"tittḥiy' añkura vijáni jaham dīṭṭhigatán' iha
"paśádeti pasann' eso mahámuni mahájane."
43. árad dhakkamávicchedá bhaggaríti bhava yathá :—
"kápi pañná kopi guṇo pakati pi aho tava!"
44. padānam dubbhinikkhepá vyámoho yattha jáyati tam vyákīṇṇam ti viññeyyam tad udāharanam yathá :—
45. "bahugūṇe panamati dūjjanānam pyayañ jano
"hitam pamudito niccam sugatam samanussaram"
46. viṣiṭṭha-vacanápetam gamman tyábhimatam yathá :
"kaññe ! kāmaya mānam mam na kāmaya si kin nu 'dam?"
47. padāsandhānato kiñci duppatiti karam bhava tam pi gamman tyabhimatam yathá :—"yá bhavato piyá"
48. vuttesu sucita-tṭhane padacchedo bhava yati yam táya hīnan tam vuttam yati hīnan ti sá pana.
49. yati sabbattha pádante vuttaḍḍhe ca visesato pubbá pará 'nekavapna padammajjhe pi katthaci.
50. tatthodāharanāni paccudāharanāni yathá :—
"tan name sírasá cīmī | kara vappam tathāgatam
"sakalá pi disá siñca | t'iva soṇṇarasehi yo."
51. saro sandhimhi pubbanto. viya lope vibhattiyá aññathá tv-aññathá tattha yádesádi parád' iva.
52. cādi pubba pádantá 'va niccam pubba padassitá pádayo nicca sambandhá parád' iva parena tu.
53. sabbatthodaharanāni yathá :—

- “name taṃ sīrasā sabbo | paṃāṭitaṃ tathāgataṃ
“yassa lokaggataṃ patta | ssopamaṃ na hi yujjati.
54. “munindaṃ taṃ sadā vanda | myanantamatim uttamaṃ
“yassa mettā ca paññā ca | nissimā 'tivijambhati.”
55. cādi pādīsu paccudāharaṇāni yathā :—
“mahāmettā mahapaññā | ca yattha paramodayā
“paṇāmi taṃ jinaṃ taṃ pa | varaṃ varagupālayaṃ.”
56. padattha-kkamato mutthaṃ kamaccutaṃ idaṃ yathā :—
“khettaṃ vā dēhi gāmaṃ va desaṃ vā mama sobhanaṃ”
57. lokiyaṭṭham atikkantaṃ ativuttaṃ mataṃ yathā :—
“atisambādham ākāsaṃ etissā thana-jumbhane”
58. samudāyatthato 'pettaṃ taṃ apetaṭṭhakaṃ yathā :—
“gāvi putto balivaddo tiṇaṃ khādī pīvi-jjalaṃ”
59. bandhe pharusatā yattha taṃ bandha-pharusāṃ yathā :—
“kharākhilā parikhīna khette khittam phalatyalaṃ”
60. ñeyyaṃ lakkhaṇaṃ anvattha-vasenāpakkaṃādināṃ
udāharaṇaṃ etesaṃ dāni sandhassiyāmyahaṃ.
61. tatthāpakkaṃaṃ yathā :—
“bhāvanādānasīlāni sammāsammāditāni' iha
“bhogasaggādi nibbāna sādhanāni na saṃsayo.”
62. ocityahinaṃ yathā :—
“pūjaniyakaro loke ahaṃ eko niramtaṃ.
“may' etasmiṃ guṇā sabbe yato samuditā ahuṃ.”
63. yathā ca :—
“yācito 'haṃ kathaṃ nāma na ajjāmyapi jīvitaṃ
“tathāpi puttadānena vedhate hadayaṃ mama.”
64. bhaggarīti yathā :—
“itthinaṃ du-jjanānaṃ ca viśāso nopapaṇṇate
“viśe siṅgimhi nadīyaṃ roge rāja-kulaṃhi ca”
65. saṃsayāṃ yathā :—
“muninda-candimāloka-rasā-lolavilocano
“jano 'vakkantaṃ anto 'va go padassanapīṇito”
66. vākyatthato duppatīti karaṃ gammaṃ mataṃ yathā :—
“poṣo vīriyavā soyaṃ paraṃ hantāna viśāmi.”
67. dutṭhālaṅkāraṇaṃ t'etaṃ yatthālaṅkāradūsaṇaṃ
tass' alaṅkāra-niddese rūpaṃ āvibhavissati.
68. kato 'tra saṅkhepa-nayā mayā 'yaṃ
dosānaṃ esaṃ pavaro vibhāgo
eso 'v' alaṃ bodhayitum kavīnaṃ
taṃ atthi ce kheda-karaṃ paraṃ pi.

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nāma paṭhama paricchedo.*

69. kadāci kavikosallā, virodho sakalo pyayam,
dosa-sañkhyam atikkama, guṇavidhi vigāhate.
70. tena, vutta-virodhanam avirodho yathā siyā
tathā dosa-parihāravabodho 'dāni niyyate.
71. tattha viruddhatthantarassa parihāro yathā :—
“vindantam pāka sālīnam sālīnam dassanā sukham,
“taṃ katham nāma meghe 'yaṃ visado sukhaye janam ?”
72. yathā ca :—
“vināyako pi nāgo 'si ; gotama pi mahāpati ;
“paṇito pi rasāpeto ; cittā me sāmi te gati.”
73. adhyatthassa yathā—
“katham tādiguṇābhāve lokam toseti du-jjano ?
“obhāsītāsesa-diso khajjotonāma kim bhavē ?”
74. paheḷikāyamāru/hā nahi duṭṭhā kiliṭṭhatā ;
“piyā sukhāliṅgitam kam āliṅgati nu no” iti.
75. yamake nopayojeyya kiliṭṭha-padam icchite
tato yamakam aññan tu sabbam etaṃ mayam viya.
76. desa-virodhino yathā :—
“bodhisatta-ppabhāvena thale pi jalajānyaham
“nudantān' iva sucirā vāsallasaṃ tahiṃ jale.”
77. kāla virodhino yathā :—
“mahānubhāva-pisuno munino manda-māruto
“sabbotukam ayaṃ vāyi dhunanto kusumam samam”
78. kalā-virodhino yathā :—
“nimuggamānaso buddhagūṇe pañcasikhassapi.
“tanti-ssaravirodho so na sampiṇeti kaṇ-janam”
79. loka-virodhino yathā :—
“gaṇaye cakkavālam so candanārapi sītalam
“sambodhisattahadayo padittaṅgārapūritam.”
80. nāya-virodhino yathā :—
“pariccattabhāvo pi tvam upanītabhavo asi
“acintyaguṇasārāya namo te munipuṅgava !”
81. āgama-virodhino yathā :—
“nevālapati kenāpi vaci viññattito yati
“sampajānamusāvādā phuseyyāpatti dukkaṭam.”
82. neyyassa yathā :—
“marīcicandanālepalābhā sitamarīcino
“imā sabbāpi dhavalā disā rocanti nibbharam.”
83. yathā vā :—
“manonurañjano mārāṅganāsīṅgāravibbhamo
“jinenāsamanuññāto mārassa hadayānalo.”
84. visesaṇāpekkhassa yathā :

- “apayátáparádham pi ayaṃ veri janāṃ jano
“kodhapāṭalabhutena bhiyyo passati cakkhunā.”
85. hīnatthassa yathā :—
“appakāṇaṃ pi pāpānaṃ pabhāvaṃ nāsaye budho
“api nippabhātānitakhajjoto hoti bhānumā.”
86. anatthassa yathā :—
na pādapūrapatthāya padaṃ yojeyya katthaci
yathā :—“vande munindassa pāda-paṇkeruhaṃ varaṃ.”
87. bhaya-kodha-pasāpsādi viseso tādiso yadi
vatthuaṃ kāmīyate doso na tatth’ ekatthatā kato. yathā :—
88. “sappo sappo ayaṃ banda ! nivattatu bhavaṃ tato,
“yadi jīvītukāmo ’si kathaṃ taṃ upasampasi ?”
89. bhaggaritino yathā :—
“yo koci rūpātisayo kanti kāpi manoharā
“vilāsātisayo kopi aho buddhamahodayo !”
90. avyāmohakaraṃ bandhaṃ avyākīṇṇaṃ manoharaṃ
adūra-pada-vinyāsaṃ pasāpsanti kavissarā. yathā :—
91. “niluppalābhaṃ nayaṇaṃ, bandhūkaruciro ’dharo,
“nāsā hemaṇkuso, tena jino ’yaṃ piyadassano.”
92. samatikkantagammattaṃ kantavācābhisāṅkhatāṃ
bandhaṇaṃ rasahetuttā gammattam ativattati. yathā :—
93. “dunnoti kāma-caṇḍālo so maṃ sadaya niddayo
“īdisaṃ vyasanāpannaṃ sukhī pi kim upekkhase ?”
94. yatihīna-parihāro na punedāni niyyate
yato na savaṇubbhedam heṭṭhā-y-etaṃ vicāritāṃ.
95. kamaccutassa yathā :—
“udāracarito ’si tvaṃ, ten’ evārādhanā tvayi
“desaṃ vā dehi, gāmaṃ vā, khettaṃ vā, mama sobhaṇaṃ.”
96. ativuttassa yathā :—
“muninda-candasambhūtayasorāsimarīcināṃ
“sakalo pyaṃ ākāso nāvakāso vijumbhane.”
97. vākyāṃ vyāpannacittānaṃ apetatthaṃ aninditaṃ,
ten’ ummattādikānaṃ taṃ vacan’ aññatra dussati. yathā :—
98. “samuddo piyate so ’yaṃ, ahaṃ ajja jarāturo,
“ime gajjanti jīmūtā, Sakkass’ Erāvaṇo piyo.”
99. sukhumālāvirodhittadittabhāva-ppabhāvitaṃ
bandhaṇaṃ bandhapharusa-dosaṃ sandūsayeyya taṃ. yathā :—
100. “passantā rūpavibhavaṃ suṇantā madhuraṃ giraṃ
“caranti sādhu sambuddhakāle keliparammukhā.”
101. apakkamassa yathā :—
“bhāvanā-dāna-sīlāni sammāsammāditāni iha
“nibbāna-bhoga-saggādi sādhanāni na saṃsayaṃ.”

102. uddiṭṭhavisayo koci viseso tādiso yadi
anuddiṭṭhesu n'ev' atthi doso kamavilaṅghane. yathā :—
103. "kusalākusalamavyākatam' ice esu paccchimam
"avyākatam pākadan na, pākadam paṭhamadvīyam."
104. saḡuṇān' āvīkaraṇe kārāṇe sati tādise
ocityahīnatāpatti natthi bhūtatthasamsino.
105. ocityam nāma viññeyyam loke vikhyātam ādarā
tatthopadesappabhavā sujanā kavipuṅgavā.
106. viññātocityavibhav' ocityahīnam parihare
tatocityassa sampose rasaposo siyā kate. yathā :—
107. "yō māraseṇam āsannam āsannavijayussavo
"tiṇāya pi na maññattha so vo detu jayaṇ jino."
108. āraddhakattukammādi-kamātikkamalaṅghane
bhaggaritivirodho 'yam gatin na kvāpi vindati. yathā :—
109. "sujanaññānam, itthīnam, vissāso nopapajjate
"visassa, siṅgano, roga-nadī-rājakulassa ca." yathā ca :—
110. "bhesajje vihite suddhabuddhādiratanattaye
"pasādam ācare niccam sajjane saḡuṇe pi ca."
111. samsayassa yathā :—
"munindacandimālokarasalolavilocano
"jano 'vakkantam anto 'va rapsidassanapīṇito."
112. samsayāy' eva yam kiñci yadi kilādihetunā
payujjate na doso 'va sa-samsayasamappito. yathā :—
113. "yāte dutiyan nilayam gurumhi sakagehato
"pāpuṇeyyāma niyatam sukham ajjhāyanādīnā."
114. "subhagā bhaginī sāya-m-etass'" ice evamādikam
'na gammad' iti niddiṭṭham kavihi sakalehi pi."
115. duṭṭhālaṅkāravīgame sobhaṇālaṅkātikkamō
alaṅkāraparicchede āvībhāvam gamīessati.
116. dose pariharitum esa varo 'padeso
sattantarānussaraṇena kato may' evam
viññāy' imaṇ guruvarān' adhikappasādā
dose param parihareyya yaso 'bhilāsī.

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bodho nāma dutiyo paricchedo.*

117. sambhavanti guṇā yasmā dosān' evam atikkame
dassessan te tato 'dāni sadde sambhūsayanti ye.
118. pasād', ojo, madhuratā, samatā, sukhumālatā,
sīleso, 'dāratā, kanti, atthavyatti, samādhayo.
119. guṇeh'etehi sampanno bandho kavi-manoharo
sampādayati kattunam kittim accantanimmalam.

120. adúráhitasambandhasubhagá yá padávalí
suppasiddhá 'bhidheyyá 'yaṃ pasádaṃ janaye yathá :
121. " alaṅkárōnto vadaṇaṃ munino 'dhara-raṃsiyo
"sobhante 'ruṇaraṃsiva sampatantá bujodare."
122. ojo samása-báhulyaṃ eso gajjassa jívitaṃ.
pajje pyanákulo so 'yaṃ kanto kámiyate yathá :—
123. " munindamandasāñjāta hāsacandanalimpitá
"pallavá dhavalá tass' ev' eko nādharapallavo."
124. padābhidheyyāvisayaṃ samása-vyása-sambhavaṃ
yaṃ páriṇatyāṃ hot' iha sopi ojo 'va taṃ yathá :—
125. " jotayitvána saddhammaṃ sandhāretvá sadevāke
"jalitvá aggikhandho 'va nibbuto so sasāvako."
126. " matthakaṭṭhi matassápi rajobhávaṃ vajantu me
"yato puññaena te senti jinapádambuja-dvaye."
127. ice atra niccappaṇatigedho sādhu padissati
jáyate 'yaṃ guṇo tikkha-paññānaṃ abhiyogato.
128. madhurattaṃ padāsatti-r-anuppāsa vasá dvidhá
siyá samasuti pubbá vaṇṇāvutti paro yathá :—
129. " yadá eso 'bhisambodhi sampatto munipungavo
"tadá-ppabhuti dhammassa loke játo mahussavo."
130. " muninda, mandahásá te kundasandohavibbhamá
"disantam anudhāvanti hasantá candakantiyo !"
131. sabba-komala-vaṇṇehi nānuppāso pasāmsiyó
yathá : " 'yaṃ málátí málá līnalolālimálini."
132. muduhi vá kevalehi, kevalehi puṭehi vá,
missehi vá, tidhá hoti vaṇṇehi samatá yathá :—
133. " kokilálápasamvādi munindálápavibbhamo
"hadayaṅgamataṃ yāti satam deti ca nibbuti."
134. " sambhāvaniyasambhávaṃ bhagavantaṃ bhavantaṃ
"bhavantasádhanákāṇkhí ko na sambhavaye vibhūṃ."
135. " laddhacandanasaṃsaggasugandhimalayānilo
"mandam áyāti bhito 'va munindamukhamárutá."
136. anittthur' akkharappáyá sabbakomalanassaṭá
kiechamuccáraṇāpetavyañjaná sukhumálatá.
137. " passantá rúpavibhavaṃ suṇantá madhuraṇ girāṃ
"caranti sādhu sambuddhakále keliparammukhá."
138. alaṅkāravihināpi satam samukhat' edisi
árohati visesena ramaṇiyá tad ujjalá
139. romaṇcapiñcharacaná sādhuvádáhitaddhani
lalant' ime munimeghummadá sādhusikhávalá.
140. sukhumálattam atthi' eva padatthavisayaṃ pi ca.
yathá : " matádi saddesu kittisesádi kittanaṃ."

141. siliṭṭhapadasamsaggaramaṇiyagunālayo
sabandhagāravo soyaṃ silesa nāma taṃ yathā :
142. “ bāliṇduvibbhamacchedanakharāvalikantihi
“ sā munindapadambhojakanti vo valitāvataṃ.”
143. ukkaṃsavanto yo koci guṇo yaḍi paṭiyate
udāro 'yaṃ bhava tena sanāthā bandha bandhati.
144. “ pādambhojarajolittagattā ye tava Gotama
“ aho te jantavo yanti sabbadā nirajattanaṃ !”
145. evaṃ jinaṇubhāvassa samukkaṃso 'tra diṣṣati :
pañṇavā vidhinā 'nena cintaye param idisaṃ.
146. udāro soṇi viññeyyo yaṃ passaṭṭhavizesanaṃ
yathā : “ kīlāsaro, līlāhāso, hemaṇḍadādayo.”
147. lokiyaṭṭā n'atikkantā kantā sabbajānānaṃ pi
kanti nāmātivuttassa vuttā sā parihārato.
yathā : “ muninda” ice ādi :
148. atthavyattābhiddheyyassāneyyatā saddato 'tṭhato
sāyaṃ tad ubhayaṃ neyyaparihāre padassitā.
yathā : “ marici” 'ce ādi : “ manonurañjano māra” 'ce ādi.
149. puna atthena yatha :—
“ sabhāvāmalatā dhīra mudhā pādānakhesu te
“ yato te 'vanatānantā molicchāyā jahanti no.”
150. ‘bandhasāro’ ti maññanti yaṃ samaggā pi viññuno
dassanāvasaraṃ patto samādhi nāma’ ayaṃ guṇo.
151. aññadhammo tato 'ññatha lokasimānurodhato
sammā ādiyate 'ce eso samādhīti nirujjati.
152. apāṇe pāṇinaṃ dhammo, sammā, ādiyate kvaci
nirūpe rūpayuttassa, nirase sarasassa ca.
153. adrave dravayuttassa, akattari pi kattutā,
kaṭṭhinassāsariṇe pi : rūpaṇ tesaṃ kamā siyā.
154. “ uṇṇāpuṇṇindunā nātha divā pi saba saṅgamā
“ viniddā sampamodanti maññe kumudini tava !”
155. “ dayāraṣesu mujjantā janā 'matarasesv iva
“ sukhitā hatadosā te nātha pādambujānatā.”
156. “ madhure pi guṇe dhīra nappasiddhanti ye tava
“ kīdisi manasovutti tesaṃ khāraguṇānaṃ lho.”
157. “ sabbatṭhasiddha cūlakapuṭapeyyā mahāguṇā
“ diṣā samantā dhāvanti kundaśobhāsalakkhaṇā.”
158. “ mārāribalavissathā kuṇṭhā nānāvidhā yudhā
“ lajjamānā 'ññavesena jina pādānatā tava.”
159. “ munindabhāgumā kālodito bodhodayācale
“ saddhammarapaṇṇā bhāti bhindam andha taṃ param param.”
160. vamanuggilaṇādy etaṃ guṇavutyapariccutaṃ

- atisundaram aññan tu kāmam vindati gammatam
 161. "kantīnam vamanavyājā munipādanakhāvalī
 "candakanti pivanti 'va nippabhan tam karontiyo."
 162. acittakattukam rūcyam icc evam guṇakammakam
 sacittakattukam p' etam guṇakammam yad' uttamam
 163. "uggiranto 'va senaharasam jinavaro jane
 "bhāsanto madhuram dhammam kam nasampiṇṇaye janam."
 164. yo saddasatthakusalo kusalo nighaṇḍu
 chando alaṅkatisu niccakatābhiyogo
 so 'yam kavittavikalopi kavīsu saṅkhyam
 oggayha vindatī hi kittim amandarūpaṃ.

*Iti Saṅgharakkhita mahāsāmi viracite Subodhālaṅkāre guṇārabodho
 nāma tatiyo paricchedo.*

165. atthālaṅkāra sahitā saguṇā bandha bandhati
 yato accantakantā 'va v-uccante te tato 'dhunā.
 166. sabhāva-vaṅga-vuttinam bheda dvidhā alaṅkriyā:
 paṭhamā tattha vatthūnam nānavatthā vibhāvinī. yathā:—
 167. "lilāvikanāsubhago disādhīravilokano
 "bodhisattaṅkuro bhāsam viroci vācam āsabhi."
 168. vutti-vatthu-sabhāvassa yā 'ññatha sā parā bhavo
 tassā 'nantavikappattā hoti vījo padassanam.
 169. "tatthātisaya, upamā, rūpak', āvutti, dīpakam,
 "ākkhepo, 'tthantaranyāso, vyatireko, vibhāvanā.
 170. "hetu, kkamo, piyataram, samāsam, parikappanā,
 "samāhitam, pariyāyavutti, vyājopavaññanam.
 171. "visesa, rūlāhaṅkāra, silesa, tulyayogitā,
 "nidassanam, mahantattham, vaṇcana, 'ppakatatthutī.
 172. "ekāvali, aññamaññam, saḥavutti, virodhitā,
 "parivutti, bhāmo, bhāvo, missam, āsi, rasī," iti.
 173. ete bheda samuddiṭṭhā. bhāvo jīvitam uccate.
 vaṅga-vuttisu poseti silesa tu siri pparam.
 174. pakāsakā visesassa siyātisayavutti yā
 lokātikantavisayā lokiyā ti ca sā dvidhā
 175. lokiyātisayass' ete bheda ye jāti-ādayo
 paṭipādiyate tvajja lokātikantagocarā
 176. "pivanti dehakanti ye nettañ calipuṭṭena te
 "nālam hantum jin' esan tvam taḥam taḥāharo pi kin?"
 177. upamānopameyyānam sadhammattam siyopamā:
 saddatthagammā vākyatthavisayā ti ca sā tiddhā.
 178. samāsapaccayevādi saddā tesam vasā tiddhā
 saddagammā samāsena "munindo candimānana"
 o

179. áyádi paccayá tehi “vadanam pañkajáyate :”
“munino nayanadvandam níluppaladaliyate.”
180. ivádi, “iva, vá, tulya, samána, nibha, sannibhá,
“yathá, sañkása, tulita, ppakása, ppatirúpaká,
181. “sari, sarikkha, samvádi, virodhi, sadisá, viya,
“paṭipakkha, paccaniká, sapakkhopamitopamá,
182. “paṭibimba, paṭicchanda, sarúpa, sama, sammitá,
“savaṇṇá, bhá, paṭinidhi, sadhammádi, salakkhaṇá,
183. “jayaty, akkosati, hasam, paṭigacchati, dussati,
“ussuyyaty, avajánáti, nindat’, issati, rundhati,
184. “tassa coreti sobhaggam, tassa kanti viluppati,
“tena siddhi vivadati, tulyam tenádhirohati,
185. “kaccham vigáhate tassa, tam anvety, anubandhati,
“tam sílam, tam nisedheti, tassa cânukarot’ ime.”
186. upamánopameyyánam sadhammattam vibhávihi
imehi upamá bhedá keci niyanti sampati.
187. “vikási padumam ’vâtisundaram sugatánanam”
iti dhammopamá náma tulyadhammanissaná.
188. dhammahíná, “mukhambhojasadisam munino” iti
viparitopamá, “tulyam ánanenambhojam tava.”
189. “tavánanam iv’ambhojam, ambhojam iva te mukham”
aññamaññopamá sáyam aññamaññopamánato.
190. “yadi kinci bhava ’mbhojam locanam bhamuvibbhamam
dháretum mukhasobhantam tave”-t’ esá ’bbhutopamá
191. “sugandhi sobhasampandhi sasiramsvirodhi ca
mukham tav’ambujam ’ve”-ti sá sílesopamá matá.
192. sarúpa saddaváccatta sá santánopamá yathá :
“báláv’ uyyána málá ’yam sálakánanasobhini”
193. “khañicando, bahurajam padumam, tehi te mukham
samánam pi samukkamsi” tyayam nindopamá matá.
194. “asamattho mukhen’ indu jina te paṭi gajjitum
jalokalánk” iti ayam paṭisedhopamá siyá.
195. “kaccham candáravindánam atikkama mukham tava
attanáva samañ jítam” ity asádháranopamá.
196. “sabbambhoja-ppabhásáro rásibhúto va katthaci
tavánanam vibháti ”ti hotabhútopamá ayam.
197. patiyate ’tthagammá tu saddasámattiyá kvaci
samása-paccayevádi saddayogam viná api.
198. “bhingá nemáni cakkhuni, nambujam mukham ev’ idam”
suvyattasadisattena sá sarúpopamá matá.
199. “may’ eva mukhasobhássety” alam indu vikatthaná
‘yato ’mbuje pi sátthi ’ti parikappopamá ayam.

200. "kim vāmbujanto bhantāli, kim lolanayanam mukham
mama dolāyate cittam" ice ayam samsayopamā.
201. kiñci vatthum 'padassetvā sadhammassābhidhānato
sāmyappatītisambhavā pativatthupamā yathā :
202. "janesu jāyamānesu n' eko pi jina-sādiso
"dutiyo nanū natth' eva pārijātassa pādapo."
203. vākyatthen' eva vākyattho yadi kocy upamīyate
ivayuttāviyuttattā sā vākyatthopamā dvidhā.
204. "jino sallesasattānam āvibhuto janān' ayam
"ghammasantā patattānam ghammakāle' mbudo viya."
205. "munindānanam ābhāti vilāsekamanoharam
"uddham samuggatassāpi kin te canda vijumbhanā?"
206. samuppejeti dhimantaṃ bhinnaliṅgādikan tu yaṃ
upamādusanāyālam etaṃ katthaci taṃ yathā :
207. "haṃsīvāyaṃ sasi" bhinnaliṅg—"ākāsaṃ sarān' iva"
vijātivacanā ; hīnā, "sāva bhatto bhaṭo 'dhipe."
208. "khajjoto bhāṇumāliva vibhati" ty adhikopamā ;
aphuṭhatthā, "balambodhi sāgaro viya saṅkhubhi."
209. "cande kalaṅko bhiṅgo 'va" ty upamāpekkhinī ayam :
khaṇḍitā, "keravākāro sakalaṅko nibhākaro."
210. ice evam ādi rūpesu bhavanti vigatādarā
karonti c' ādaraṃ dhīrā payoge kvacid eva tu.
211. "itth' ivāyaṃ jano yāti" : "vadaty esā pumā viya" :
"piyo pāṇā ivāya' me" : "vijjā dhanam iv' añcitā."
212. "bhavaṃ viya mahīpāla Devarājā virājate.!"
"alam aṃsumato kacchaṃ tejasārohituṃ ayam."
213. upamānopameyyānam abhedassa nirūpaṇā
upameva tirobhūtabhedā rūpakam uccate.
214. asesavatthuvisayam, ekadesavivatti ca,
taṃ dvidhā : puna, paccakaṃ samāsādivasā tidhā.
215. "aṅgulidalasamsobhi, nakhadīdhitikesaraṃ,
"sīrasā napīlandhanti ke, munindapadambujam."
216. "ratanāni guṇā bhūri, karuṇā sitalaṃ jalaṃ
"gambhīrattam agādhattaṃ paccakkho 'yaṃ jino 'mbudhi."
217. "candikā mandahāsā te muninda vadaninduno
"pabodhayaty ayam sadhumanokumudakānanam!"
218. asesavatthuvisaye pabhedo rūpake ayam :
ekadesavivattimhi bhedo 'dāni pavuccati.
219. "vilāsahāsakusumaṃ rucirādharaṇapallavaṃ
"sukhaṃ ke vā na vindanti pāssantā munino mukhaṃ."
220. "pādadvandaṃ munindassa dadātu vijayam tava
"nakharampi paraṃ kantā yassa pāpajaya-ddhajā"

221. "sunimmalakapolassa munindavadaninduno
"sādhuppubbuddhahadayam jātam keravakānanam."
222. rūpakāni bahuny eva yuttāyuttādibhedato
visum na tāni vuttāni 'etthev' antogatāni 'ti.
223. "sitapupphujjalam lolanettabhiṅgan tavānanam
"kassa nāma mano dhīra nākaḍḍhati manoharam."
224. "candim 'ākasapadumam" ice etam khaṇḍarūpakam
duṭṭham : "ambhoruhavanam nettāni" ecādi sundaram.
225. pariyanto vikappānam rūpakassopamāya ca
natthi yan tena vinneyyam avuttam anumānato.
226. punappunam uccāraṇam yam atthassa padassa ca
ubhayesaṇ ca viññeyyā sāyam āvuttināmato :
227. "mano harati sabbesam, ādadāti disā dasa,
"gaṇhāti nimmalattā ca, yaso-rāsi jinass' ayam."
228. "vibhāsenti disā sabbā munino dehakantiyo
"vibhāsenti ca sabbāpi candādinam hatāviya"
229. "jitvā viharati klesa-ripum loke jino ayam
"viharaty ārivaggo' yam rāsibhuto 'va dujjane."
230. ekattha vattamānampi sabbavākyopakāraṇam
dīpakam nāma : taṇ c' ādi-majjh-anta-visayam tidhā.
231. "ākāsi buddho veṇeyya bandhunam amitodayam
"tad aññesan tu jantunam visam niccopatāpanam."
232. "sabha pāpehi ca samam nekatithiya, maddanam"
"dassanam munino sādhujanānam jayate matam
233. "accantakantalāvanyacandātapamanoharo.
"jinānanindu-r-indu ca kassa nānandako bhava."
234. "hotāvippaṭṭisārāya sila pāmojjahetu so
"tam pītihetu sā cāyam passaddhyādi pasiddhiyā."
235. ice ādidīpakatte pi pubbam pubbam apekkhinī
vākyamālā pavattā' ti tam mālādīpakam matam.
236. anen' eva ppakārena sesānam api dīpake
vikappānam vidhātābbānugati' suddhabuddhihi.
237. visesavacanicchāyam nisedhavacanan : tu yam
akkhepo nāma so yaṇ ca tidhā kālappabhedato :
238. "ekāki nekasenan tam maram sa vijayi jino
"katham tam athavā tassa pārami balam idisam."
atitakkhepo.
239. "kiṇ citt' ejāsamugdhyātam appatto 'smīti khijjase
"paṇāmo nanu so yeva sakimpi sugate kato?"
vattamānakkepo.
240. "saccam na te' gamissanti sivaṃ sujanagocaram
"micchādīṭṭhiparikkantamānasā yesu dujjanā."

anāgatakkhepo.

241. ñeyyo satthantaranyāso yo 'ññavākyatthasādhano.
sabbavyāpi visesaṭho, hi-visiṭṭhāssa bhedaṭo.
242. "tepi lokahitāsattā sūriyo candimā api
"atthaṃ passa gamissanti niyamo kena laṅghate?"
243. "satthā devamanussānaṃ vasi sopi munissaro
"gato 'va nibbuti, sabbe saṅkhārā na hi sassatā."
244. "jino samsāarakantārā janāṃ pāpeti nibbuti.
"nanu yuttā gati sāyaṃ vesārajjasamaṅgināṃ?"
245. "surattan te 'dharapuṭaṃ jina rañjete mānaṃ
"sayāṃ rāgaparittā hi pare rañjete saṅgete."
246. vācche gamme 'tha vatthūnaṃ sadisaṭṭhe pabhedanaṃ
vyatireko 'yaṃ apy ekobhayabhedā catubbidho.
247. "gambhīrattamahattādiguṇā jaladhinā jina
"tulyo tvam asi, bhedo tu sarīrenedisena te!"
248. "mahāsattātīgambhīrā sāgaro sugato pi ca,
"sāgaro 'ñjanasaṅkāso jino cāmīkarajjuti."
249. "na santāpapahan, n' evicchitadāṃ, migalocaṇaṃ;
"muninda, nayanadvandaṃ tava taggu abhūṣitaṃ."
250. "munindānaṃ ambhojaṃ esaṃ nānattam idisaṃ,
"suvuttāmatasandāyī vadaṇaṃ, n'edis' ambujaṃ.
251. pasiddhaṃ kāraṇaṃ yattha nivattetvāñña kāraṇaṃ
sābhāvikaṭṭham athavā vibhāvyaṃ sā vibhāvaṇā.
252. "anañcitasitaṃ nettaṃ adharo 'rañjitāruṇo
"samānatā bhamu cāyaṃ jinānāvāñcitā tava."
253. "na roti khalu dujjanyaṃ api dujjanasaṅgame.
"sabhāvanimmalatare sādhujaṇṭuna' cetasi."
254. janako ñāpako ceti duvidhā hetavo siyūṃ
paṭisaṅkhāraṇaṃ tesāṃ alaṅkāratayoditaṃ.
255. bhāvābhāvakiccavasā, cittaḥetuvasā pi ca
bhedaṇantaṃ idam tesāṃ mukhamattanidassanaṃ.
256. "paramatthappakāsekaraṇā sabbamaṇoharā
"munino desanāyaṃ me kāmaṃ toseti mānaṃ."
bhāvakiccokāraḥhetu.
257. "dhīrehi sahasamvāsa, saddhammassābhiyogato,
"nīggahen 'indriyānaṃ ca, dukkhass' upasamo siyā."
abhāvakiccokāraḥhetu.
258. "muninda, candaṃvādikaṇṭabhāvopasobhinā
"mukheṇ' eva subodhan te maṇaṃ pāpābhiniṣṣaṇaṃ."
bhāvakiccokāraḥhetu.
259. "sādhuhatthāravindāni saṅkocayati te kathaṃ
"muninda, carapadvandaraḥgabālātapo phusaṃ."

- ayuttakāri cittaheṭṭu.
260. "saṅkocayanti jantunaṃ pāṇipañkeruhān' iha,
"munindassa pādadvandaṃ nakhaṇḍānam aṃsavo."
yuttakāri cittaheṭṭu.
261. uddiṭṭhānaṃ padatthānaṃ anuddeso yathākkamaṃ
saṅkhyānaṃ iti niddiṭṭhaṃ yathāsaṅkhyakamo pi ca.
262. "ālapahāsalilāhi, muninda, vijayā tava,
"kokilā, kumudāni, copasevante vanā, jalā." "
263. siyā piyatarāṃ nāma attharūpaṃsa kassaci
piyassātissayen' etaṃ yaṃ hoti paṭipādanāṃ.
264. "pīti yā me samuppannā santa sandassanā tava,
"kālenāyaṃ bhavē pīti tad eva puna dassanā."
265. vaṇṇitenopamānena vutthā 'dhippetavattuno
samāsavutti nāmāyaṃ atthasaṅkheparūpato.
266. sāyaṃ viṣesamattena bhinnābhinnavisesanā
atth' evaṃ aparā pyatthi bhinnābhinnavisesanā.
267. "visuddhāmatasandāyī passattharatanālayo
"gambhīro cāyaṃ ambodhi puññenāpādito mayā."
268. "icchatatthappado, sāro, phalapupphopasobhito,
"sacchāyo, 'yaṃ apubbo 'va kapparukkho samutṭhito."
269. sāgaratthena saddhammo : rukkhatenodito jino :
sabbe sādāraṇā dhammā pubbat', aññatra tu ttayaṃ.
270. vattuno' ñāppakāreṇa tthitā vutti tad aññatā
parikkappiyate yattha sā hoti parikkappanā.
271. upamābbhantaratthena, kiriyādivasena ca,
kamenodāharissāmi vividhā parikkappanā.
272. "icchābhaṅgātur' āsina tā 'tiniccalam accharā,
"vasaṃ nent' iva dhīraṃ taṃ tadā yogābbhiyogato."
273. "gajāṃ māro samāruḥho yuddhāy' accantam unnataṃ
"maggam anvesati nanu jinabbhito palāyituṃ."
274. "muninda, pādadvande te cārurājivasundare
"maññe, pāpābhisammaddajātasaṇḍena saṇḍimā."
275. maññe, saṅke, dhuraṃ, nūna-m, iva, icc evaṃ ādihi
sāyaṃ vyaññiyate kvāpi kvāpi vākyena gamyate.
276. "dayāsaṅcārasarasā dehā nikkhantakantiyo
"piṇḍā jina te sādhujaṇaṃ sarasataṃ nayuṃ."
277. ārambhantassa yaṃ kiñci kattupuññavasā puna
sādhanaṇtaralābho yo taṃ vadanti samāhitāṃ.
278. "mārāribhangabhimukhamānaso tassa satthuno
"mahāmahi mahāravaṃ ravi 'yaṃ upakārikā."
279. avatvābhimataṃ tassa siddhiya dassināññathā
vadanti taṃ 'pariyāyavuttī' ti sucibuddhiyo.

280. "vivaṭaṅgaṇanikkhittaṃ, dhaṇaṃ āraḁkhavaṇṇitaṃ,
"dhaṇakāmayathākāmaṃ tuvaṃ gaccha yad' icchasi."
281. thuti karoti nindanto viya taṃ vyāḁavaṇṇaṃ
doṣābhāṣā guṇā eva yaṇti saṇnidhiṃ atra hi.
282. "saṇcāletuṃ alaṃ tvaṣi bhuṣaṃ kuvalāyākhilaṃ
"viṣesaṇ tāvatā nātha guṇaṇaṃ te vadāma kiṃ."
283. viṣeṣicchāya dabbassa kriyājātiguṇassa ca
vekalladassanaṃ yaṭra viṣeṣo nāmaṃyaṃ bhava.
284. "na rathā, na ca mātaṇḁā, na haṃyā, na paḁātayo,
"jito mārāri muṇiṇā saṃbhaṛāvaḁḁaṇeṇa hi."
dabbaviṣeṣavutti.
285. "na baḁḁhākuṭi, neva puriṣo ḁassanaḁcchaho
"mārāribhaṅgaṇ cākasi muṇiḁhīro vaṛo saṃyaṃ."
kriyāviṣeṣavutti.
286. "na ḁiṣāsu vyāṭaraṃṣi, nāloko lokaṃatḁhato
"tathāpaṇḁhaṭamaḁaraṃ ṃaraṃ sāḁhusubhāṣitaṃ."
jāṭiviṣeṣavutti.
287. "khaṛaṃ na hi vātaddhaṃ muṇiṇḁavaḁaṇaṃ tava
"tathāṃi gāḁhaṃ khaṇati ṇiṃulaṃ ḁaṇatāṃaḁaṃ."
guṇaviṣeṣavutti.
288. ḁassiyate 'tiritṭantu sūraṃvīraṭḁhaṇaṃ yaṭi.
vaḁanti viṇṇu vaḁaṇaṃ rūḁhāhaṇkāraṃ iḁiṣaṃ.
289. "ḁame naḁoṃaṇaḁassa kiṃ me vyāṃaraḁassanā
"ṃuttā me ṃāḁasaṃbhaṭṭā saḁḁā saṇt' eva tāḁiṣe."
290. siṣeṣo vaḁaṇāṇekābhidheyyekaṃaḁāyutaṃ
abhinṇaṃaḁaḁavākyāḁiṃasa tāḁhāyaṃ īṛito.
291. "aṇḁhaṇamaḁaro hāri saṃarūḁho maḁoḁayaṃ
"rāḁate ṛaṃsiṃāli 'yaṃ bhagaṃvā boḁhaṃyaṃ ḁaṇe."
abhinṇaṃaḁaḁavākyasiṣeṣo.
292. "sāraḁāmaḁakābhāṣo saṃāṇitaṃariḁkḁayo
"kuṃuḁākaṛasaṃboḁho ṃiṇeti ḁaṇatāṃ suḁhi."
bhinnāṃaḁaḁavākyasiṣeṣo.
293. "saṃāḁitaṭṭaṃiṇayo aḁiṇamaḁaḁaḁḁaṇo
"suḁato viṣaḁaṃ ṃātu ṃāṃiṇaṃ so viṇāyako."
bhinnābhinnāṃaḁaḁavākyasiṣeṣo.
294. 'viṛuḁḁhāvīṛuḁḁhābhinnakamma, ṇiyaṃaṃvā, ṃaro
'ṇiyaṃakkheṃaṃaḁaṇo, 'viṛoḁhiviṛoḁhy, aṃi
295. 'ocityasaṃṃosaḁāḁi, siṣeṣo ṃaḁajāṭi 'ti:
eṣaṃ ṇiḁassaneṣv eva ruṃaṃ āṃibhaṃviṣṣati.
296. "saṃase vaṭṭayaṃ lokaṃ akḁilaṃ kaḁaviḁḁaḁo
"ṃarābhavaṭi mārāri; ḁhaṃmaṛāḁā vijuṃbhate."
297. "saḁhāṃaḁaḁhuraṃ ṃuṇṇaviṣeṣoḁayaṣaṃbhaṃyaṃ

- “supanti vācam munino janā passanti cāmatam.”
298. “andhakārapahārāya, sabhāvamadhurāya ca,
“mano pipeti jantunam, jino vācāya bhāya ca.”
299. “kesakkhinam ’va kaṇhattham, bhamunam yeva vaṅgatā,
“paṇipādādharānam ’va munindassa ’bhirattatā.”
300. “pāṇipādādharesv eva sārāgo tava dissati
“dissati so ’yam athavā nātha sādhuḡeṣv api !”
301. “salakkhaṇo ’tisubhago tejasi niyatodayo
“lokeso jitasamkleso vibhāti samapissaro.
302. “asamopi samo loke, lokesopi naruttamo,
“sadayopyadayo pāpe, cittāyam munino gati.”
303. “saṃsāradukkhopahatāvanatā janatā tvayi
“sukham icchitam accantam amatan dada vindati.”
304. ḡuṇayuttehi vatthuhi samam katvāna kassaci
saṃkittanam bhavati yam sā matā tulyayogitā.
305. “sampattasampado loko sampattālokasampado
“ubhoḡi raṃsimāli ca, bhagavā ca, tamonudo.
306. atthantaram sādhayatā kiṇci tam sadisam phalam
dassiyate asantam vā santam vā tam nidassanam
307. “udayā samapindassa yanti pāpā parābhavam
“dhammarājaviruddhānam sucarantā durantatam
308. “sironikkhittacarāṇo ’echariyān’ ambujān’ ayam
“paramabbhutatam loke viññāpet’ attano jino.”
309. vibhutiya mahantattham adhippāyassa vā siyā
paramukkam satam yātam tam mahantattham iritam.
310. “kirīṭaratanacchāyānuviddhātapavāraṇo
“purā param siri vandi bodhisatto ’bhinikkhama.”
311. “satto sambodhiyam bodhisatto sattahitāya so
“hitvā senaharabandham api rāhulamātaram.”
312. gopetvā vaṇṇaniyam yam kiṇci dassiyate param
asamam vā samam tassa yadi sā vaṇṇanā matā.
313. “purato na saḡassesu na pañcesu ca tādino
“māro paresu tass’ esam saḡassam dasavaḡḡhitam.
314. “vivādam anuyuñjanto munindavadanindunā
“sampaṇṇo candimā nāyam chattam etam manobhuno.”
315. parānuvattanādihi nibbippenemā yā thuti
thuti appakate sāyam siyā appakatatthuti
316. “sukham jivanti hariṇo vanesv aparasevino
“anāyāsopalābhehi jaladappaṇkurādihi.”
317. uttaram uttaram yattha pubbapubbavisesanam
siyā ekāvali sāyam dvidhā vidhi nisedhato.
318. “pādā nakhalirucirā, nakhāli raṃsibhāsura,

- “rampi tamopahānekarasā, sobhanti satthuno.”
319. “asantuttho yati n’ eva santoso nālayāhato,
“nālayo yo sa jantunam anantavyasanāvaho.”
320. yahi bhūsiya bhusattam aññamaññan tu vatthunam
vināva sadisattan tam aññamaññavibhūsanam
321. “vyāmsumandalam tena munina lokabandhunā
“mahanti vindate kantiṃ so pi ten’ eva tadisi.”
322. kathanam sahabhavassa kriyāya ca gugassa ca
sahavuttīti viññeyyam tad udāharānam yathā :
323. “jalanti eandarasīhi samam satthu nakhamasavo
“vijumbhati ca candena samam tam mukhacandimā”
324. “jinodayena malinam saha dujjanacetasā
“pāpam disā suvimalā saha sujjanacetasā”
325. virodhinam padatthānam yattha samsaggadassanam
samukkamsābhidhānattham mata sāyam virodhitā
326. “guṇā sabhāvamadhurā api lokekabandhuno
“sevitā pāpasevinam sammadūśenti mānasam”
327. yassakassaci dānena yassakassaci vatthuno,
visitthassa yam ādānam, parivuttīti sā matā.
328. “purā paresan datvāna manuñnam nayanādikam,
“muninda, samanupatto dāni sabbaññutāsiri,”
329. kiñci disvā na viññatā paṭipajjati tam samam
samsayāpagatam vatthum yattha soyam bhamo mato.
330. “samam disāsujjalāsu jinapādanakhamsumā
“passantā abhinandanti candātapamanā janā.”
331. pavuccate yamnamādi, kavinam bhāvabodhanam
yenakenacivāṇṇena, bhāvo-nāmāyam iritam
332. “nanu te yevasantā no sāgarā, na kulācalā,
“manam pi mariyādam ye samvatte pi jahanti no?”
333. aṅgaṅgibhāva sadisaphalabhāvā ca bandhane
samsaggo ‘laṅkatitam yo tam ‘missan’ ti pavuccati
334. “passathā munino pādanakharamsīmahanadi
“aho gaḷham nimuggepi sukhayaty eva te jane!”
335. “veso sabhāvamadhuro, rūpam nettarasāyanam,
“madhu ‘va munino vācā, na sampinneti kam janam.”
336. “āsīnāma siy’ atthassa itthassasinam yathā :—
“tilokekagati nātho pātu lokam apāyate!”
337. rasappatitījanakam jāyate yam vibhūsanam
rasavantanti tañ ñeyyo rasavantavidhānato.
338. “rāgānatāmbhutasarojamukhan dharāya
“pādā tilokagārūno ‘dhikabandharāgā
“ādāya nīccasarasena karena gāḷham

"sañcuppayanti satathāhita sambhamena"¹

339. ice ānugamma purimācariyānubhāvam
sañhhepato nigatito yam alaṅkatīnam
bhedo 'parupari kavīhi vikappiyānam
ko nāma passitum alam khalu tāsam antam.

*Iti Saṅgharakkhitā mahāsāmī vicarite Subodhālaṅkāre atthālaṅ kārā-
vabodho nāma catuttho paricchedo.*

340. paṭibhānavatā lokavohāramanusārīnā
tatocityasamullāsavēdinā² kavīnā paratam.
341. thāyisambandhiṇo bhāvavibhāvā sānubhāvakā
samajjanti nibandhā te rasassādāya sādhanam.
342. cittavuttivisesā tu bhāvayanti rase yafo
ratyādayo tafo bhāvasaddena parikattitā.
343. virodhinānūabhāvena yo bhavo na tirohito
sīlena tiṭṭhati 'ce eso thāyibhāvo' 'ti saddito
344. rati, hāso ca, soko ca, kodh' ussāha, bhayam pi ca
jigūcchā, vimhayā, c', eva samo ca, navaṭhāyino.
345. tiro bhāvā vibhāvādi visesenābhimukhato
yete caranti sīlena te honti vyabhicāriṇo
346. nibbedo, takka, saṅkā, sama, dhiti, jalatā, dīnat' uggālasattam,
suttam, hāso, galān', ussuka, tarasa, sat' assā, visadāvahiddhā,
cintā, gabbāpamāramarisa, mada, mat', ummāda, mohā, vibodho,
niddāvegā, savilam, maraṇa, sacapalā, vyādhi tettiṃsam etc.
347. samāhitattappabhavam satta' tenopapādītā
sattikā, py anubhāvatte visup bhāvā bhavanti te.
348. thambha, paḷaya, romaṇca, tathā sed', assu, vepathu,
vevaṇṇiyam, visaratā, bhāvātth' etc 'hu sattikā.
349. yadā ratyādayo bhāvā, dhitisilā na honti ce
tadā sabbe pi te bhāvā bhavanti vyabhicāriṇo.
350. vibhāvo kāraṇa tes' uppattiy' uddīpane tathā
yo siyā bodhako tesam anubhāvo 'yam irito.
351. nekaḥetu manovuttivisesaṇ ca vibhāvitum
bhāvam vibhāvānubhāvā vaṇṇiyā bandhena puṭam.
352. savibhāvānubhāvehi bhāvā tete yathāraham
vaṇṇiyā yatocityam lokarūpānugāminā.
353. cittavuttivisesattā mānasā sattikāṅgato
bahinissatasedādi anubhāvehi vaṇṇiyā.
354. sāmājikānam ānando yo bandhatthānusārīnam
'rasiyati' ti taññuhi raso nāmāyam irito.
355. savibhāvānubhāvehi sattikāvyabhicārihi

- assādiyattam āniyamano thāyeva so raso.
356. siṅgāra, hassa, karuṇā, ruddha, vīra, bhayānakā,
bibhacchābbhuta, santā ca, rasā thāyin' anukkamā.
357. dukkharūpe 'yam ānando kathan na karuṇādike
siyā sotunam ānando soko Vessantarassa hi.
358. rammadesakalākālayesādipatisēvino,
yuvānaññoññarattāna pamādo rati-r-uccate.
359. yutyābhāvānubhāvā te nibandhā posayanti naṃ
sopyāyogavippayogasambhogānaṃ vasi tidhā.
360. vikārāgati ādihi attano 'tha parassa vā
hāso niddāsamālāssamuccchādi vyabhiṇṇāribhi.
paripose siyā hāso bhiyyo 'tthippabbutināṃ so.
361. sītam iha vīkāsīnayanāṃ, kiñcālakkhīya dvigantu hasitāṃ,
madhurassarāṃ vihasitāṃ, aṃsasirokammam upahasitāṃ,
362. apahasitāṃ sajalakkhī, vikkhittāṅgaṃ bhavaty atihāsītāṃ,
dve dve hāsā kathitā c' esāṃ jetthe majjhe jamme pi ca kamato
363. sokarūpo tu karuṇo 'nitthappattiṭṭhanāsato,
tatthānubhāvā ruditapa/ayaṭṭhambhakādayo.
visādālasayamarāṇacintādi vyabhiṇṇāriṇo.
364. kodho macchariyādihi pose tāsamaḍādihi
nayanārūpakādihi ruddho nāma raso bhavē.
365. patāpavikkamādihi' ussaho vīro ti saññiṇo,
raṇadānadāyāyogā vīro 'yaṃ tivīdho bhavē.
366. tevānubhāva, dhītimatyādayo vyabhiṇṇāriṇo.
367. vikārasanasattādibhayukkāṃso bhayānako
sedādayo 'nubhāv' ettha tāsādi vyabhiṇṇāriṇo.
368. jīgūcchā rudhirādihi putyādihi virāgato
bibhaccho khobanubbegi kameṇa karuṇāyuto
nāsāvīkūṇanādihi saṅkādihi 'ssa posanāṃ.
369. atilokapadatthehi vimhāyo 'yaṃ raso 'mbhuto
tassānubhāvā sedassusādhuvādādayo siyup
tāsāvegadhītippañña hont' ettha vyabhiṇṇāriṇo.
370. thāyibhāvo samo mettadayāmodādisambhavo
bhāvādihi tad ukkaṃso santo santanisevito.

Iti Saṅgharakkhita mahāsāmi vicarite Subodhālaṅkāre rasabhāṇaṇa-
dho nāma pañcama pariccheda.

SUBODHĀ'LANKĀ'RA NITTHITAM.

Lists of Rare Muhammadan Coins.—No. I.—Coins of the Kings of Dihli and Jaunpūr.—By J. G. DELMERICK, Dihli.

(With a plate.)

Ghiya's-uddi'n Balban.

Pl. IX, 1. Gold. Weight, 169 grs. A. H. 670.

السلطان الاعظم		الامام
غياث الدين		المستعصم امير
ابو المظفر بلبن		المومنين
السلطان		

Margin — ضرب هذه السكة بحضرت دهلي في سنة سبعين وستمائة

The Balban inscription discovered by me at Sonipat and published in the Society's Proceedings for May 1873, bears the same date as this coin.

Kutb-uddi'n Muba'arak Sha'h.

Pl. IX, 2. New Variety. Silver. Weight, 168 grs. Circular piece.
Dār-ul Mulk, A. H. 717.

الامام الاعظم		مبارك شاه السلطان
قطب الدنيا و الدين		ابن السلطان الواثق
ابو المظفر خليفه الله		بالله امير المومنين

Margin — ضرب هذه الفضة بحضرت دار الملك في سنة سبع عشر وسبعماية

This coin shews either a new place of mintage, or *Dār-ul Mulk* is only another designation for *Dihli*, *Dār-ul-khilāfat*, or *Ḳuṭbābād*, which are observable on other published coins of this king.

Pl. IX, 3. New Variety. Silver. Weight, 83 grs. A. H. 720.

الامام الاعظم		خليفه الله مبارك شاه
قطب الدنيا		<i>Circular area</i> —
والدين		<i>Margin</i> — السلطان الواثق بالله امير المومنين
ابو المظفر ٧٢٠		

Ghiya's-uddi'n Tughluq Sha'h.

Pl. IX, 4. New variety. Gold. Weight, 170 grs. A. H. 725.

المتوكل علي		غياث الدنيا
الله ابو المظفر		والدين ناصر
تغلق شاه		امير المومنين

Margin — ضرب هذه السكة خمس وعشرين وسبعماية

1875.] J. G. Delmerick—*Lists of Rare Muhammadan Coins.*—No. 1. 127

Mahmu'd Sha'h, bin Muhammad Sháh, bin Fírúz Sháh.

Pl. IX, 5. Gold. Weight, 169 grs. A. H. 802.

السلطان الاعظم ابو المظفر محمود شاه محمد شاه فيروز شاه سلطان		في زمن الامام امير المؤمنين خلعت خلافته ٨٠٢
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Mahmu'd Sha'h, bin Ibráhím Sháh, of Jaunpúr.

Pl. IX, 6. Gold. Weight, 165 grs. A.H. 847.

المؤيد بقايد الرحمن خليفة الله بالحق والبرهان		ناصر الدين والدين ابو المجدد محمود شاه السلطان
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Margin— ***** ٨٤٧ *****

Mura'd Bakhsh.

Pl. IX, 7. Gold. Weight, 169 grs. A. H. 1068. Ahma d á b á d.

محمد مراد بخش بادشاه غازي تاج الدين **** ابو المظفر ضرب احمد اباد		The Kalimah. <i>Margin</i> —The names and titles of the companions of the Prophet. ١٠٦٨
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Sha'h Jaha'n.

Pl. IX, 8. Silver. Weight, 176 grs. A. H. 1069.

شهاب الدين محمد شاه جهان بادشاه غازي ١٠٦٩		The Kalimah. ضرب سنه ٣٢ الهي *****
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Pl. IX, 9. Silver. Weight, 176 grs. A. H. 1069.

شاه جهان بادشاه غازي ٣٢ محمد شهاب الدين صاحب قران ثاني ضرب احمد اباد		The Kalimah. <i>Margin</i> —The names and titles of the four companions of the Prophet. ١٠٦٩
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Aurangzib.

Pl. IX, 10. Silver. Weight, 175 grs. A. H. 1070. Patna.

سکه مبارک ابو المظفر
محیی الدین محمد
اورنگ زیب عالم گیر بہادر
۱۰۷۰

ضرب
سنہ احد جلوس
میمنت مانوس
پتنہ

I possess a good many coins of Aurangzib. They show that after the deposition of Sháh Jahán in A. H. 1068, some confusion prevailed in the mints of the Empire. For instance at Multán, Ilahábád, Itáwah, and Dihlí, the coins were after his victory at Samogar at once issued in the name of Aurangzib. At Ahmadábád they were struck indiscriminately in the names of Sháh Jahán and Murád Baksh during A. H. 1068, and in the name of Sháh Jahán only during A. H. 1069. While, as will be seen from the coin now published, at Patna, owing no doubt to the influence and presence of Shujá' in the vicinity, no coins were struck in the name of Aurangzib until A. H. 1070.

The statement of Bernier that Aurangzib refrained from any overt assumption of sovereign rights for a year, or until his return from Láhor, is not borne out by his coins. He seems to have immediately assumed those rights, which were certainly recognized as far as his authority extended.

I may also add here that a silver coin of Aurangzib in my possession, struck at Multán, presents the novel fact that the exclusive use of the word *مهر* on the gold, and of the word *بدر* on the silver coins of the earlier period of his reign, was not so strictly observed as on the later coins. The word *مهر* appears to have been used at the commencement on his gold and silver coins alike. Afterwards this word was used on his gold coins, and *بدر* on his silver coins only.

Rafi'-uddaraja't.

Pl. IX, 12. Silver. Weight, 174 grs. A. H. 1131.

زد سکه بہند با هزاران
برکات شاہنشاہ بحروبو
رفیع الدرجات ۱۱۳۱

ضرب سنہ احد
جلوس میمنت مانوس
کوزا

Rafi'-uddaulah.

Pl. IX, 11. Gold. Weight, 169 grs. A. H. 1131.

سکه مبارک
شاہ جہان
بادشاہ غازی
۱۱۳۱

ضرب فرخندہ بنیاد حیدرآباد
جلوس میمنت مانوس

Muhammad Ibra'hīm.

Pl. IX, 13. Silver. Weight, 174 grs. A. H. 1132.

سکه زد در جهان بفضل کریم
شاه شاهان محمد ابراهیم

۱۱۳۲

ضرب سنه احد
جلوس میمنت مانوس
دارالخلافه شاه جهان آباد

Sayyid Husain 'Alī Khān Bārha, according to the *Tārīkh-i-Muzaffarī*, was assassinated on the 6th of Zil Hajjah, A. H. 1131. Sayyid 'Abdullah, his brother, got intelligence of the event on his way from Agra to Dihlī on the 8th of the same month. He at once made up his mind to supplant Muhammad Shāh by placing a pliant puppet upon the throne. With this view he sent his agent into Salīmgāh for a candidate. The crown was first offered to the sons, successively, of Mu'izz-uddīn Jahāndār Shāh, but they all refused it, and shut their doors against the faces of the Sayyid's agents, who then went to Nekūsiyar, the son of Prince Akbar; but this young man stole away and hid himself. At last they went to the apartments of Sulṭān Ibrāhīm, the son of Rafī'-ulqadr (Rafī'-ushshān) and the brother of Rafī'-uddarajāt and Rafī'-uddaulah, and prevailed on him to accept the throne.

The coronation took place at Dihlī on the 11th Zil Hajjah; and on the 17th, Sayyid 'Abdullah marched with this new pageant of royalty and a large army against the Emperor Muhammad Shāh, who was then in the neighbourhood of Palwal. They met the Emperor near Hasanpūr. The battle of Shāhpūr was fought immediately after, which ended in the defeat and capture of Sayyid 'Abdullah. Ibrāhīm fled, but was seized and brought back. The Emperor pardoned him.

Thus it will be observed that Ibrāhīm occupied the throne nominally for one month only, and my coin, which is dated A. H. 1132, must have been struck during the first eighteen days of his very brief reign.

Translation of the Ayodhyá Máhátmya, or 'Pilgrimage to Ayodhyá'.—By
RA'M NA'RA'YAN, *Bareilly College.*

The Ayodhyá Máhátmya, according to Mahárájá Mán Siñh, professes to be the work of Ikṣváku, of the solar race. Ayodhyá and Sarayú are said to own their existence to Vas'ishṭha Muni, their spiritual guide, from whom are descended the Vas'ishṭha Bráhmans of Ayodhyá. It is said to have been created in the Tretá Yuga, and stands on the Sudarsana Chakra, or war-wheel of Rámachandra. But according to Umádat Paṇḍit, the Ayodhyá Máhátmya is a mere transcript from the Skanda and Padma Puránas, and is not the composition of a Rájá of Audh.

Ayodhyá, the most ancient sacred city of the Hindus, and for many centuries the seat of the kings of the solar race, is situated upon the river Sarjayú, which unites with the Ghághrá at Sehorghát, 30 miles west of Faizábád, where a fair is held at the full moon of Paus.

The word 'Ayodhyá' is derived from the Sanskrit prefix *a*, not, and *yodh*, battle. It means 'not to be fought against'.

The origin of the city, according to the Hindus, was this. The eldest son of Brahmá, the Deity's creative energy, named Sáyambhuva Manu, once went to his father's dwelling and said to him, "Please give me a fine place to live in." Brahmá took him to Vishṇu, who bestowed on him the wonderful and splendid Ayodhyá. The site was selected and the city was built upon it.

TRANSLATION.

Chapter I.

Once Párvatí said to Mahádeva—"You are omniscient and have related several religious stories; I now wish to hear some account of Ayodhyá, and especially its Máhátmya. It is an ancient city and dear to Rámachandra. They say that it stands first among all other holy places, and is the bestower of *mukti* (salvation); describe therefore its extent; the great kings that have ruled in it; the number of sacred spots; their advantages; the good attending residence in it; the river that flows there; and the benefits arising from bathing in it at the different gháts on peculiar days; with the things that should be given on those occasions." Mahádeva, having saluted Ayodhyá and Rámachandra, answered,—“It has the great river Ghághrá on the west and the old Sarayú flowing near; it is the goddess of learning; and the abode of Vishṇu and Hari is here. Hear the Máhátmya of Ayodhyá, which is the source of great happiness, and gives absolution of sins. This city was built by God in the beginning of the creation, and is well-known in all the three parts of the world. Its origin was this. The

eldest son of Brahmá, named Sáyambhuva Manu, the protector of his subjects, once went to his father's dwelling, and stepped up to him with joined hands. Brahmá, being pleased, benignly asked him :—"O son, tell me quickly why you have come here." Manu replied, "You have ordered me to create the world, please give me an agreeable place to live in."

Brahmá took his son with him and went to Vaikunṭha, the chief mansion of Vishṇu's paradise, which is a square, having four gates, one on each side, and beautiful fortifications, and all the gods bow to it. Here fairies sing harmoniously ; the Sáma Veda, the best of the Vedas, is sung by the Gandharvas ; and all the inhabitants are four-armed, wearing the finest and most valuable ornaments. The door-keeper of the eastern gate is Chanda-Parachanda ; of the western, Jayá-Bijayá : of the southern, Bhadra-Subhadra ; and of the northern, Dhátá-Vidhátá. In the middle of this place was a temple of jewels, having a throne of the same material, on which was seated Bhagaván Vāsudeva Vishṇu.

Brahmá, having joined his hands, said with a sweet voice, "O god of gods, thou hast mercy upon thy devotees, and Manu is one of them ; give him, therefore, some land to live on." Vishṇu, with much pleasure, bestowed on him, in the centre of the earth, this wonderful and splendid Ayodhyá. Brahmá then came to our mortal world with Manu, and Vishṇu sent Vasiṣṭha and Viśvakarma with an order that the latter was to build a city as the former might desire. The site was accordingly selected, but the ground being found unfit for such a purpose, the Sudarsanachakra was formed, and upon it the foundation was laid. Various kinds of shrines, palaces, roads, markets, gardens decorated with jewels, trees bearing beautiful fruits and flowers, birds of melodious voices, innumerable elephants, horses, chariots, bullocks, cows, all sorts of virtuous men and women provided with every thing, were created. The Sarayú flows near it, and the gháts are made of precious stones. Here the lotus and fragrant flowers are blossoming ; different kinds of birds are singing in harmony ; gods, goddesses, and celestial beings, are bathing ; and the most powerful, good, handsome, and well-versed-in-knowledge, Súrya-bapsí rájás were born. To the west is the confluence of the sacred Gharghará and Sarayú, the latter flowing from the west northwards and then to the east. The Ganges and the Sarayú are both called 'Brahma-Svarúpa' waters, where devotees and sages live, and all the capital sins are washed away by bathing. Ayodhyá is, therefore, suited to the meditation of Vishṇu, S'iva, and Brahmá ; they all three keep it in their minds. It is the first abode of Vishṇu : whoever remains there finds felicity. No one can fully describe its greatness. From the Lakshmana-kunḍa, which has a thousand streams, one yoyana (four miles) to the east and as far to the west,

and from the Sarayú to the Tons, it is called Antarágára [middle house]. Commencing from the Guptar, it extends towards the east."

End of Chapter I, the reading or hearing of which causes all sins to disappear, and good actions to make their appearance.

Chapter II.

Párvatí asked—"What are the benefits of a pilgrimage and visit to Ayodhyá ; how many sacred places and gods are there ; and in what month and on what bathing days should the pilgrimage be performed ?" S'iva answered, "Listen carefully to what I say. I have to mention things which are secret and without a beginning. When a man thinks of going to Ayodhyá, his deceased ancestors are released from hell and sin, and repair to heaven, and for every step on his way, he reaps the reward of an As'vamedha (a horse sacrifice). He who advises another to perform the pilgrimage, or in some way becomes the cause of it, is absolved from all sin, and obtains his wishes. He who pays the pilgrim his travelling expenses, goes to heaven with his sons and grandsons. He who provides a tired pilgrim with a conveyance, goes in the conveyances of the gods to their regions. He who gives food and water to a hungry and thirsty pilgrim, gains the fruit of S'ráddhas performed at Gayá and of bathing in the Makar season [Capricorn-is] at Ilahábád, and his forefathers are blessed with everlasting happiness. He who supplies a bare-footed pilgrim with shoes, obtains the conveyance of an elephant. But he who in any way stops such a pilgrimage, goes to hell, and suffers innumerable agonies for an unlimited period. He who furnishes a pilgrim with a vessel for water, derives the advantage of keeping a thousand páonsálaks. He who anoints a pilgrim's feet with oil, or washes them well, will obtain his desires in both worlds. The pilgrim, who listens to anecdotes of Vishnu, or sings hymns on his way, is looked upon as virtuous. The pilgrim, who, dismounting from his conveyance, stretches himself on the ground and weeps tears of love, is free from capital crimes, from the guilt attending the use of corn and water not belonging to himself, and from the Panch-súná. At the mere sight of Ayodhyá, the sins committed by treading upon corn, wearing shoes, &c., to which every one is liable, and which are called 'Panch-súná,' and those of seven births, are removed. Do not doubt this. Listening to religious stories on the pilgrimage, reading treatises on the attributes of God and repeating his name, gives access to Him. He who, on seeing Ayodhyá, prostrates himself on the ground, and bows down before it, becomes free from all sins and reaches the Deity. The benefits which a pilgrim becomes entitled to by visiting Ayodhyá and by meditation on Ráma, are indescribable, and on seeing Ráma's image all his sins are destroyed. Hear me, Párvatí, the mere sight of the Sarayú nullifies all sins ; bowing down before it removes all worldly troubles, and bestows upon man every kind of joy. The Sarayú water washes away all crimes."

On hearing this, Párvatí asked what the manner was of performing the pilgrimage, to secure all its advantages, and go to the place of Vishṇu. Mahádeva replied—"He who performs the pilgrimage with all his organs of action and perception restrained, and with the profession of living the life of a Brahma-chári, will reap all its rewards; others will not be deprived of the usual ones. The rich should give charity, and the poor undergo privations, that is, perform the pilgrimage, and fast three nights successively. The wealthy will become poor if they do not give alms in proportion to their riches. Remaining in this holy place and observing all the prescribed ceremonies, entitles a man to the full benefits of performing sacrifices and giving alms. Even sages and gods attained superiority and affluence from remaining, bathing, and worshipping at this sacred city. Such a pilgrimage should therefore be performed. He who, having bathed in the Sarayú, adores the gods, gains the reward of an As'vamedha-Yajña. Feeding a single Bráhmaṇ at the Sarayú, leads to blessings in both worlds. One who eats fruits and the roots of vegetables, and freely gives the same to a Bráhmaṇ, gains the advantage of an As'vamedha-Yajña. Men living here are not transformed into mean creatures, and are freed from transmigration of the soul. He who thinks of Ayodhyá, morning and evening, reaps the fruit of visiting all the holy spots in it. The seven Púris (sacred places) constitute the body of Vishṇu; Avantiká, called Ujjain, the foot; Káncí, the waist; Dvarká, the navel; Haridvár, the heart; Mathurá, the neck; Kás'í, the fore part of the nose; and Ayodhyá, the head, which is the principal member of the body. Visits to this place and bathing at it wash away the sins of men and women. Even as Vishṇu is superior to all the gods, so is Ayodhyá to all the holy places; he who stops here for twelve nights, derives the advantage which he would derive by performing all sorts of sacrifices. Remaining only one night bestows upon him the blessings of a hundred sacrifices on the fire. Residence, devotion, and charity at Ayodhyá, are only obtainable through great virtues. Fasting here twelve nights, a man obtains the benefit of going once round the whole of India, as also whatever he wishes. One night's abode at Ayodhyá with purity, gives freedom from degradation and accomplishment of one's desires. Ayodhyá is the form of Parabrahma; the Sarayú, of Sagúnabrahma; and the inhabitants of Ayodhyá, of Jagannátha. I attest the truth of the above with an oath. O Párvatí, the Vedas, the gods, Brahmá, Vishṇu, and myself, are unable to describe fully the greatness of Ayodhyá."

Chapter III.

Párvatí now asked Mahádeva regarding the origin of the Sarayú. All the Munis are anxious to hear an account of that river. Mahádeva answered—"The Sarayú has herself described her origin. It is as follows: Once

S'ri Raghunátha amused himself at the door of the heavens with his brothers and companions; they were dressed in their best, and wore beautiful ornaments, so that they were loved by all the people of the three worlds. Each was mounted on the shoulders of a companion and fanned with a fly-flapper. Protected by charms and spells, they caused the residents of the place great delight; men, women, boys, youths and old men, were present: it was the day of the full-moon of Jyaisht̥ha. Maháráj Das'aratha had also come there to bathe. S'ri Raghunátha asked his companions, where his father was, and wished to be carried to him. A chobdár replied, 'The Mahárájá has gone to bathe in the Sarayú', and added, 'You, too, may go there, it is very near.' On hearing this, Raghunandana smiled and said, 'Let us go,' and kicked the companion on whose shoulders he was mounted. The companion, with all the children, proceeded towards the Sarayú, which greatly pleased every passenger. By this time the Mahárájá had bathed, performed the religious ceremonies, and was ready to go away with the sages, when a messenger reported the approach of Raghunátha with his brothers and companions. The Mahárájá waited till they arrived. The brothers, having dismounted from the shoulders, went to the Mahárájá, and paid their respects to him. Raghunandana sat in his lap; the Mahárájá gave the children fine seats and thus addressed them—'Dear boys, salute the Sarayú', and they all did so. Then the Mahárájá, placing the boys in front, and joining his hands, in the presence of the company devoutly prayed, saying—'O goddess Sarayú, I bow down before thee whom all the gods and virtuous persons (Brahmá and Nárada included) worship; who flowest from the lake of Mánasasarovara, and washest away all sins. Those who visit thee or think of thee, are freed from sins. Those who drink thy water, never suck the milk of their mothers. Manu and other Mahárájás worshipped thee. Men who depart from this world on thy banks, with thy name on their lips are endowed with blessings; they reap the highest rewards of mundane existence. There is no doubt of this. Thou hast sprung from the eyes of Náráyana, what am I when the gods sing thy praise? The advantages of all the sacred places flow from thy waters; I therefore repeatedly bow down before thee. Thou art the daughter of my spiritual guide, and I prostrate myself before thee; release me from all worldly ties. All these children are thine and have come to thy protection; please guard and nourish them.'

Having thus praised her, the Mahárájá gave a lac of gold-muhurs to the Bráhmans through the hands of the children, to gain her favour. On hearing the prayer of the Mahárájá, the Sarayú assumed a beautiful form, appeared before the children and sat amongst them, dressed in excellent clothes and decorated with precious ornaments. The Mahárájá, placing his head on her feet, saluted her, and so did all the children, and Sarayú bestowing

her blessings on them, took Rámachandra in her lap, conferred on him a necklace of pearls, and addressed the Mahárájá thus—‘This child is dear to the whole world, and always lives in my bosom. The learned know this from their penetrating sight.’ She then added—‘Whoever shall read your prayers or mine at the time of bathing, shall be endowed with the benefits that flow from bathing in all sacred places.’ Having said this, she took all the children, Rámachandra included, to her bosom. Thereupon the Mahárájá was greatly astonished, and making a bow, asked her origin. “Because Vās’ishṭha,” said he, “brought thee, thou hast received the name of Vās’ishṭhí; but how didst thou come to take my children, tell me with thy own lips.” Sarayú said,—“Hear, Mahárájá. In the beginning of the creation, a lotus sprung from the navel of Náráyana, which gave birth to Brahmá, who began to worship Vishṇu by his order. When he had done so for a thousand years, Vishṇu, more handsome than ten millions of cupids and mounted on his vehicle Garuḍá, came, and seeing Brahmá deeply engaged in worship, was pleased with him, and shed tears of joy from his eyes. Brahmá, who was devoted to adoration, opened his eyes, saw Náráyana, made a prostration, gathered in the palm of his hand the tears that flowed from the eyes of Bhagaván, kept them in a wooden vessel, and, knowing the flow to be righteous, deposited them in the reservoir of his heart, by bathing in which Loka Pitámaha was born. After a long time, the first of the Solar race became king of Ayodhyá; his son Ikshaku, thy ancestor, offered up prayers to the great sage Vās’ishṭha, who praised Brahmá. On this Brahmá became pleased with him, and told him to ask for a boon. He solicited Brahmá to give him a holy river, and his request was complied with; for he gave him the same water that had flowed from Náráyana’s eyes. Sarayú said, ‘I will flow in the form of a river, and accordingly the sage walked ahead and I followed him. I always keep Rámachandra near my bosom, and those who think of me, with him, obtain salvation and piety. This is undoubtedly true. Rámachandra is áll truth and joy, born through your devotion to protect the virtuous and kill the wicked.’

After having related the above story, Sarayú disappeared. The inhabitants of Ayodhyá were greatly surprised, and said—“O Das’aratha and Sarayú, you are both very fortunate.” Then the Mahárájá, having taken leave of his spiritual guide, went home, rejoicing in his luck. Because the great sage Vās’ishṭha brought her, she is called Vās’ishṭhí, and as she came for the sake of Rámachandra, she is styled Rámangangá. Whatever good results from remaining at Kás’i for a thousand ages; at Prayág for twelve years in the Makara season; at Mathurá, for a kalpa; at Avantiká for a krora of kalpas, and bathing in the fullmoon night in the month of Kártika at the junction of Kirtiká, and for 60,000 years in the Ganges, is obtained by the mere sight of the Sarayú. Ayodhyá confers more blessings on men than a Sráddha at Gayá and a pilgrimage to Jagan-

nátha. The same salvation which Yogis gain by residing at Kás'í and dying there, is available to all, provided they bathe in the Sarayú. He who prays to God for a moment, and even for half a moment, wherever he may be, but bathes with joy in Ayodhyá, is freed from the transmigration of his soul. The water of the Sarayú, which is the representation of Brahmá, is the bestower of salvation. Here, no one is judged by his actions, they are all counterparts or manifestations of Ráma. Men, animals, birds, insects, and worms, receive salvation at this place."

Chapter IV.

Mahádeva continued, "O goddess, I am about to describe the first sacred place (in Ayodhyá). Its name is Svargadvár [gate to heaven], and it is the bestower of both heaven and salvation. After enjoying the fruits of heaven, a man obtains salvation and freedom from transmigration. No one can sufficiently describe its advantages, but I will do so briefly. Its dimension is 318 yards, and it is situated east of the thousand-streamed Lakshmana Kuṇḍa. Those who are versed in the Puráṇas say that there has neither been, nor will ever be, so holy a spot as this on earth. I also affirm on oath that there is no such place in the world, because all the heavenly and earthly holy spots unite here in the morning, and consequently people should particularly bathe here at that time. The man who dies here goes to the regions of Vishṇu. Svargadvár, after bestowing heaven, gives salvation, and hence it is called 'Muktadvár'. Whatever a man desires, he obtains here. The benefits of devotion, sacrifices, giving alms, building reservoirs, wells, &c., are here everlasting. The sins of a thousand births are destroyed on entering Svargadvár. All men, Hindús and Musalmáns, animals, birds, and insects, that die here, go to the place of Vishṇu, become four-armed, lotus-eyed, bear the Sankha, Chakra, Gadá, Padma, and ride on Garuḍas. Whoever dies at Svargadvár, whether he had any desire or not, goes to heaven. Gods, angels, and sages, all bathe here publicly or privately at noon. Those who restrain their passions, keep fasts even for a month, give away grain, jewels, lands, cows, clothes, &c., and die here, gain salvation. S'rí Rámachandra, who is the very identity of the godhead, always remains here in the forms of Bharata, Satrugṇa, Lakshmana, and his own. There is no distinction of north or south at the time of death,* because salvation is certain in every position. One who gets himself shaved, fasts, and visits Chandra Hari, obtains heaven, and all his great crimes are washed away. The reason is that the Moon considered this place the most excellent one of Vishṇu, and came here, and performed all the pilgrimages and prayers, thus pleasing Hari. He said—'Whoever shall bathe at this spot and look at my image, shall go to heaven.' There are seven Haris here who all encourage good

* The custom among the Hindus is that when a man is about to die, he is laid down on the ground, with his feet towards the south.

actions—Gupta Hari, Chakra Hari, Vishṇu Hari, Dharma Hari, Bilva Hari, Punya Hari, and Chandra Hari. The mere sight of these increases virtues; the worship of the last is more important. The worshipping of Bráhmans, Chandramá, and Hari, pleases Vāsudeva. This place is sacred, O Párvatí. The pilgrimage of it takes place at the full-moon of Jyaishṭha, the second lunar month, when the advantages of all the gods are obtained. It is called one of the most sacred spots in the Puráṇas. Giving alms at Svargadvár produces everlasting happiness. This is beyond question."

Chapter V.

Párvatí now asked Mahádeva regarding the advantages of visiting N á g e s' v a r, and said, "O Mahádeva, how long have you been at Svargadvár, and who has consecrated the monument in which you live?" Mahádeva answered, "Listen to my origin. When Rámachandra, having given his kingdom Kushávatí to his son Kusha, went to enjoy himself in heaven, situated on Sakait, Ayodhyá became sorry and repaired alone to Kusha in Kushávatí at midnight. The Rájá was sleeping. When he awoke, he saw Ayodhyá and asked, 'Whence have you come? Are you a goddess, or a celestial, or a human being? What has made you come to my house? The descendants of the solar race do not speak with any one's wife when alone.' Ayodhyá then replied, 'O Maháráj, your father has taken away all my inhabitants to Sakait, and it is a pity that when you are the ornament of your family, I should be so treated; no Muni nor any other devotee comes to my place; all my beauty is gone, and my buildings are destroyed. As light vanishes when the sun sets, or as clouds disappear when the wind blows strongly, so is my condition. None of your ancestors ever did what your father has done.' Kusha said, 'O goddess, you say so, but it is not the fault of my father, it is the result of the residence in your place that all the inhabitants have gone to heaven.' Then Ayodhyá replied, 'If this is the benefit of my abode, you should also live there, so as to obtain the company of your father.' Having said this, she disappeared. When the day broke, Kusha related to his ministers what had transpired the night before. They advised him to comply with Ayodhyá's request. Accordingly, he went to the city with a large army, headed by Bráhmans, and peopled it as it was before.

"Once the Rájá got into a boat with his companions, and went to amuse himself on the river. He was enjoying himself there, when Kamudatí, the sister of Sokun, a serpent who had from a long time lived in the Sarayú, became enamoured of Kusha and carried off his *kangan*. Kusha took no notice of it, because he was engaged in diversion, but when he came out of the water, he missed the ornament. It had been given by Agastya to Raghunátha, from whom Kusha had received it on going to Sakait. This caused Kusha great anxiety. He got enraged, and put an

arrow of fire on his bow, to dry up the waters of the Sarayú. The Sarayú, being terrified, fell to his feet, called out for mercy and said—‘It is not my fault; Kamudatí, the sister of Sokun has carried off the ornament.’ Hearing this, he postponed the use of the arrow, and reading over it the charm called Garuḍa Mantra, flung it against the serpent. When this was done, the serpent came with his sister, who fell to his feet, gave back the ornament, and begged to be pardoned for her fault.” Mahádeva further said, “O goddess, the serpent was my devotee, and seeing his misfortune, I appeared. Kusha touched my feet, and, folding his hands, asked the cause of my appearance. I then replied, ‘The serpent is my devotee, and for the sake of his protection I have come forward; so forgive his fault, marry his sister, let the serpent go, and ask for a boon, O Maháráj.’ Kusha answered, ‘Please remain at Svargadvár, which is known by the name of Náges’var.’ O Párvatí, having said this, the Mahárájá worshipped me, and, taking excellent things, read my six-letter-mantra, and said, ‘Whoever shall bathe at Svargadvár, and visit and worship Náges’var in the prescribed manner, shall be blessed, and his pilgrimage shall be fruitful: otherwise he shall reap only half the benefit of it.’” Mahádeva said, “Having thus declared and worshipped me, Kusha went home, and the serpent also repaired to his abode. O Goddess, since then I have remained at Svargadvár.”

“I am now about to relate the story of Dharma Hari. Its locality is south-east of Chandra Hari, as described above. A visit to it destroys all the sins of the Kaliyuga. Its origin is as follows: Once Dharma came here on a pilgrimage, performed it with great strictness, and, fully knowing the great and incomparable benefits of Ayodhyá, said with much pleasure, ‘Hari resides here, who can sufficiently, praise its advantages? There is no other sacred place equal to Ayodhyá; for it does not touch the earth, but remains separate from it, supported on the Sudarsana Chakra. How excellent are the holy spots of this place! All of them bestow the regions of Vishṇu. All things here are worthy of praise.’ Having said this, and being filled with joy, he began to dance. Seeing Dharma dancing in this manner at the wonderful benefits of Ayodhyá, Vishṇu appeared dressed in yellow silk vestment. Dharma, observing Hari, paid his respects, and praised him thus—‘O inhabitant of the ocean of milk, and sleeper on the head of S’eshanága, whose feet Mahádeva touches, and which remove the sorrows of his devotees, who lovest devout austerity, whose body is full of joy, and whose eyes are most beautiful, who art omniscient, and the husband of S’rí Lakshmí, whose feet are like the lotus, who hast the lotus in the navel from which Brahmá sprung, whose feet are touched by the waves of the milky ocean, and whose Sáranga [horny bow] is the destroyer of enemies, whose sleep is replete with devotion, whose vehicle is Garuḍa, on whom Yogís meditate, who art ever happy and invisible, who art the

nourisher of cows, whose hair is beautiful, and charming to all; whose nose is handsome; whose forehead is fair and glorious; who keepest the Chakra for the destruction of the wicked; whose yellow dress is so auspicious, that the mere sight of it destroys sins and fulfils one's wishes; who hast Lakshmi, Sarasvati, and other handsome goddesses by thy side; whose four arms are beautiful and are the bestowers of the four fruits* and the upholders of the four yugas (ages); whose thighs are fair and charming; who art all-knowing and everywhere present; who holdest a club for the punishment of the wicked, and assumest different shapes, such as those of the Lion, the Tortoise, &c., for the preservation of virtue and the protection of the world!"

Mahádeva then told Párvati that when Dharma thus praised Hari, the husband of Lakshmi was pleased, and said, "O Dharma, I am satisfied with your praises; ask for a boon." Having said this, he granted a boon of his own accord to the effect that whoever should read the above mentioned hymn, would be blessed, and venerable and wealthy in the world. Dharma then said: "As thou hast been pleased with me, I station you here and give you the name of Hari." Then Bhagaván said, "It will be better to call me by the name of Dharma Hari, so that your name may be pronounced first and then mine. All sins are destroyed when a man takes the name of Dharma Hari." Such a boon was bestowed.

Mahádeva then addressed Párvati as follows—"With due ceremonies Dharma Hari was thus stationed. Therefore, he who, after bathing in the Sarayú, will joyfully visit Dharma Hari, shall be freed from all sins. The fruits of giving alms, performing sacrifices and devotion, feeding the poor, &c., at this place, are everlasting, and admittance into heaven is certain. It is wise if a man who commits sins knowingly or unknowingly, performs a little *práyaschitta* [penance] in due form here. No one can fully describe the greatness of this sacred place; what I have said is but little. When performing the pilgrimage on the 11th of the lunar half of the month of Asárh in the following manner, a man is sure to obtain heaven. He should bathe at Svargadvár, visit Dharma Hari, and worship him, which will destroy all his sins, and he will go to the regions of Vishnu.

To the north-east of Dharma Hari, there is a ghát of the name of Jánaki-Tírtha; here the pilgrimage is performed on the 3rd day of S'ravana, especially in the light half of that month. The reward of bathing, giving alms, performing worship and sacrifice, and feeding Bráhmans here, is everlasting.

South of it is the Rámaghát, the advantages of which are indescribable, but I shall relate them briefly."

Chapter VI.

Mahádeva said, "O Párvati, the space to the south of Rámaghát and Svargadvár, in all directions, is called Ayodhyá Píṭha [sacred spot], in

* Ártha (wealth); dharma (religion); káma (wish); moksha (salvation).

the middle of which is Ráma Sabhá, adorned with all sorts of jewels. Similar places of Indra, Yama, Varuṇa, Kubera, and other celestial beings, are nothing compared to this. In fact, Brahmá and others have no such thing. A heap of sins equal to the mountain Merú, is destroyed by its mere sight. One visit to it removes the sins of thousands of former births. All the gods render homage to it, and Rámachandra, together with his brothers, performs the functions of sovereignty in the middle of it. The fruits of the virtuous actions of a man are increased by once going round this place and visiting and worshipping Raghunátha.

South of it lies the *M a d a n t D h a v a n K u ṇ ḍ*, bathing in which frees from all pride. Raghunátha, with his brothers, uses his tooth-brush here. On one occasion, Konduna Muni, having bathed in this pond, performed the usual ceremonies of prayer, when the wind blew so terribly, that his deer-skin was carried into it, from the effects of which the skin assumed the shape of a glorious deity, who ascended a most brilliant throne, adorning himself with precious necklaces and other ornaments, and fanned by celestial beings, Gandharvas singing and Apsarás dancing about. Seeing this, all were astonished. At this time Rámachandra appeared, and although he knew all, he asked the deity who he was, how he had become a deer, how he had now obtained this fair body, and what he was about to do. He replied, "Rámachandra, you know every one internally and externally, but as you have asked me, I have to say, O Raghunandana, I was a Vyása in my former birth, always acted contrary to the Vedas, and, from pride of riches, never minded what I was told. I never said prayers, did not fast, and gave no alms. I was wholly given to sensual pleasures. But I did one good action, *viz.*, I unintentionally sprinkled water on a Tulsí plant. From that virtue, I became a deer, and my skin was used by a devotee and conveyed to Ayodhyá with godly and religious persons. It touched the water of this place and assumed this beautiful form. I have now seen you, and beg to be admitted to heaven, free from pain, age, and death." This was granted, and getting into a glorious vehicle he ascended to the regions of Rámachandra, whence there is no returning. The pilgrimage of the said pond is performed on the 9th of the dark half of Chait. West of the Sabhá is *R á m k o ṭ*."

Then Párvatí asked, "Where are the places occupied by the monkeys, who came with Rámachandra after the southern conquest?" Mahádeva replied, "At the gate of the Palace lives Hanumána, to the south of him Sugriva, and near him Angada. At the southern gate of the Fort reside Nala and Níla, and near them Sokhain. To the east, there is a place called *N a v a r a t n a* [nine jewels—a temple with nine spires], north of which lives Gaváksha. At the western door of the Fort resides Dudhavakra. Here

(Mahádeva says) I, too, am known by the name of Durgesvara. Near this lives Sut Bul ; a little farther, Gandha-mádana, Kikshuba, Surubha, and Punus. At the northern gate of the Fort lives Bibhishana, and east of him Surma, whose wife is respected by all ; she protects the virtuous and punishes the vicious. To the east of her is the residence of Vighnesvar, whose sight removes all obstacles that are in the ways of men. East of it lives Pindaruk-vira, who defends Ayodhyá and chastises the wicked. East of him is the abode of Vira Matta-gajendra, the bestower of happiness ; and, at a short distance from it, is a pond, bathing in which leads a man to perfection. The protector of Ayodhyá, Vira Sunkay, is the fulfiller of our desires. His pilgrimage is performed on the 5th of the Nine-nights,* and on every Tuesday. He who worships him with perfumes, flowers, and betel-leaves, and offers him food, obtains his wishes. In the eastern part of it lives Dovid ; in the north-east, the wise and intelligent Mayind ; in the southern portion, Jámbuvána ; and in the south, Kesari. These protect the Fort in all directions. At the gate resides Mahávira [Hanumán], who is the object of worship of the whole world. He is a sage who keeps his passions in subjection, and is adored by all men and women.

East of it lies H a n u m a t - k u n d , the sight and touch of, and bathing in, which confers all sorts of blessings. O Goddess, the pilgrimage to Hanumána, the son of Anjaná [the air] and the bestower of our desires, takes place every Tuesday. All kinds of joys are at the disposal of him who, having bathed in his pond, visits and worships Hanumána in due form. The worshipper should say, ‘O son of Anjaná, destroyer of Jánakí’s† grief, king of the monkeys, murderer of the son of Uchh, I bow to you and offer perfumes and flowers.” Having done this, he should enter the Fort and pay his respects to the R a t n a - M a n d a p a.”‡

Chapter VII.

Then Mahádeva said, “ In the most beautiful city of Ayodhyá, stands the R a t n a - M a n d a p a, impregnated with camphor, rosewater, and other perfumes. In the middle of it is Kalpa vriksha,§ and in the centre of that is the Ratna Siñhásan, very excellent, adorned, and embroidered with sapphires, the lustre of which removes darkness. In the middle of the above is an eight-leaved lotus of gold, decked with many jewels and shining like the morning sun. In its centre is a heart-ravishing image, having eyes like the leaves of the lotus, wearing clothes, embellished with various gems. It is the image of Raghunátha, whose body is very soft and smooth, glorious like the sun, and of the color of clouds. There is also the daughter of Janaka,

* These occur in the last halves of Chait and Kúár, and are sacred to Deví.

† Rámchandra’s wife.

‡ A jewelled shed.

§ The tree which gives whatever a man asks.

shining as lightning : Rámachandra is fifteen, and she twelve years old, their ages remaining always the same. Her beautiful eyes are like the lotus, and extend to the ear; her neck shews a line like the conch; her cheeks are fair; her eyes, a little red; her face is beautiful as the full-moon; her hair, black; her forehead, high and long; her eyebrows like the two sides of a divided mango; her tilak is of saffron; her nose, like a piece of diamond; her teeth, like the seeds of a pomegranate; her voice is sweet; her looks, full of pity; and her arms like the trunk of an elephant. The hands of the husband of the daughter of Janaka are like the flowers of the lotus; his fingers are fine; his thigh is as heavy as the stem of a plantain; his foot like that of the lotus; the toes like the hollow portions of the leaves of that plant; his nails as fair as the moon; his carring shining like the sun; his face is very handsome; he wears wreaths of pearls and rings on his hands, feet, and toes, S'ri-vatsa* and Bhrigu-latá† on the chest, which is adorned with Kaushtubha Mani;‡ he wears a Baijanti;§ and the tilak is of musk and saffron. Jánakí is also adorned in the said manner. Both Rámachandra and Jánakí are sitting on the throne, and behind them is Lakshmana, of white color, with an umbrella in his hand. Bharata and Satrugan, the former black and the latter white, and adorned like Rámachandra and Lakshmana, are here with a flapper and a fan. Hanumán stands before them with joined hands. A man should worship Hanumán, Sugriva, Jámbovāna, Sokhain, Bibhishan, Nala, Níla, Angada, Rishava, Vasishṭa the spiritual guide, Bámadeva, Javála, Kássbyap, Markundeya, Madgul, Parbat, Narúd, Jeit Bijay, Surashtra, Keshtra Bardhan, Ashoke, Dharmapála, Sumantra, the eight companions, Indrá and other rulers of the directions of the world, and last of all, the gods that reside in the heavens. Then he should worship Raghunátha, read the 'Taraká mantra, which is the best of all mantras, offer perfumes, flowers, betel-leaves, and give alms according to his means. Having done this, he should repeat the following prayer—'O Rághavendra Mahárájá, destroyer of Ravana and Achehoit [immortal], I am full of sins; protect me, I flee to you; I bow to you; you are Rámachandra, Vridha Bráhma, Raghunáth, and Jánakí-pati. The origin of the above names is this. When you were young and began to give, you were called Rámabhadra (prosperous). As you grew older and looked beautiful, the people named you Rámachandra; when you commenced to speak, they called you Vedha-Brahma; Raghunáth, on your ascension to the throne; and Jánakí-pati, when you were married to Jánakí. I bow to you, O king of the gods, Mahátman [great], and life of Jánakí. You protected the refugees Sugriva and

* A line of hair.

† Bhrigu is the name of a Bráhma who struck Rámachandra on the chest with his feet.

‡ The name of a jewel.

§ The name of a flower-garland.

Bibhishana ; I, too, am a refugee, protect me likewise !” He who performs the above, obtains all his wishes. After the prayer to Rámachandra, he should address one to Jánakí, daughter of Videha, who, on account of his perfect knowledge, is engaged in the meditation of Brahma, and is entirely careless of his body (*videha*). “ I bow before your feet, which have entangled the minds of Yogis, and which those of others do not reach. When the mind once thinks of them, it remains fixed upon them for ever. The Munis meditate on them, to remove their three kinds of táps [passions], bodily, mental, and that which proceeds from organs of action and perception. The last perform their actions by the guidance of their respective deities, and become useless when they withdraw their influence over them ; such as when the sun, the deity of the eye, withdraws his essence from it, the eye does not suffer, it remains just the same, but can no longer see. This is also the case with the nose, the tongue, &c., which cease to perform their functions when their deities withdraw their powers. This union of the organs and their deities is called Daivak. The bodily passion is named Adibhautika, &c. ; the mental one, Adhyátmika. Afterwards, he should go to J a n m a b h ú m i [birthplace of Rámachandra]. East of Vighnesvar, or north of the residence of Vas’ishta, or west of that of Lomasa Rishi, is the J a n m a s t h á n, the giver of salvation, the mere sight of which releases a man from returning to a woman’s womb. The fasting on the day of Ráma Navamí, visiting the place with devotion, giving alms and performing pilgrimages and sacrifices, frees a man from the transmigration of his soul. A visit to it yields the reward of giving one thousand cows, obeying father, mother, and the spiritual guide, and performing the Rájásúyia, and Agni-hotra [sacrifices] one thousand times.”

Then Párvatí asked in what way people should keep the fast of Ráma Navamí. S’rí Sankara replied—“ To confer greatness on Navamí, Rámachandra was born of the womb of Kaushalyá. On that day, a Tuesday, which falls on the bright half of Chait, the Nakshitra was Punarvasu, and the time was midday. The gods and celestial beings being highly pleased with it, of their own accord began to play upon musical instruments. The fast of Navamí is considered superior to all other fasts, just as the Chintámani is the best of all jewels and the Kalpa-vriksha of all trees. Those who keep this fast, and listen to religious stories, perform religious dances, and give alms on that day, obtain salvation. It fulfils the wishes of the gods, protects the virtuous, and destroys the wicked. It bestows more advantages than millions of sacrifices, because the adorable Ráma was born on that day. All the actions which a man performs on that day, in the name of Raghunátha, give everlasting benefits. He who wishes to go to Raghunátha, should keep this fast. The fool who eats on that day, shall go to hell, where all the vicious are thrown into boiling oil. There is no doubt about it. The deceased ancestors of him who on that day makes offerings in their names,

are admitted to the regions of Vishnu, and he who gives alms according to his means, reaps the benefits of the highest degree of charity. How good and important is this fast! and how virtuous are those who keep it! They are sure of obtaining heaven. He who keeps this fast, reaps the fruits of giving alms during an eclipse of the sun and of bathing at Kúrukshetra [north of Dillí], and performing sacrifices there; and when keeping it according to the prescribed ceremonies, a man does no more return to woman's womb, but becomes Ráma himself. A Vaishnava, who does not fast, when there is a union of the Ashtamí and Navamí, but on a pure Navamí day, and reads religious books, such as the Puráṇas, on the following Dasamí, gains all kinds of benefits. This is certain."

Chapter VIII.

Then Mahádeva said, "Having kept the fast, he should repair to the Birthplace, worship and pray, as already prescribed. He should place Raghunandana in a six-sided vessel of gold or silver, and when he cannot afford either, on the back of a leaf of the Bela-tree, marked with three cross-lines, worship him, and throw flowers upon him after reading the twelve-letter-mantra of Vāsudeva. In the same manner, he should worship the vessel or leaf, upon which he has stationed Raghunandana, and invoke the fifty-seven gods that obtain a place there. After this, he should offer perfumes, flowers, articles of food, &c., praise them with folded hands, touch the six corners after reading the mantra, beginning with Hridai, the breast, head, the tuft of hair on the top of the head, clothes, eyes, weapons, and worship them with sixteen prescribed things, repeating the Múla-mantra during the whole time. He should then worship Indra, Lokapála, Vasishṭa Muni, &c., with their peculiar mantras, take arghya,* and throw it upon Raghunandana, saying "Thou art the destroyer of Rávana, protector of Dharma and the devotees, and art Bhagaván, please accept my offering with your brothers.'

All this should be performed on the Navamí. O Goddess, hear what the benefits are of worshipping on the Navamí. It is related that in ancient times there were five wicked persons in the country of Marakántár; one Lampaka, an oil-maker; Sanku, a weaver; Luntak, a Naṭ; Dushta Dhívar, a sailor; and Dharma Kahár. They lived in five different cities. The oil-maker accidentally killed a cow when he was making oil, for which sin he was turned out of the city by the Rájá. The weaver cohabited with the wife of his younger brother, for which he was also banished. The Naṭ was expelled for attacking passengers with bows and arrows in jungles. Dhívar and Kahár being thieves,

* Water containing sandal, rice flour, and betel-nut.

were once seized and brought before the Rájá. Some told him to kill them ; others, to cut off their limbs ; but the Rájá sent them to a sage named Vimalatma [pure soul], who ordered the king to confiscate their property, shave their whiskers, beards, and tufts of hair on the head, and turn them out of the kingdom, which was done. They met in a forest, whence they used to attack and plunder towns. In this way they collected large sums of money, which they spent in keeping women, drinking wine, and eating meat. They abused cows, bráhmans, spiritual guides, and even the gods. The Rájá at last expelled them from the forest. Wherever they went, they suffered much distress. They visited many countries and committed innumerable crimes. Once the inhabitants of Dihlí proceeded to Ayodhyá, to bathe there on the day of the Navamí. The thieves, with the intention of plundering them on the road, accompanied them. The pilgrims asked them who they were, on which the thieves replied that they were pilgrims and residents of the country of Marakántár. Thus they all arrived at Ayodhyá, but the thieves had no opportunity to plunder the pilgrims. The celestial protectors of Ayodhyá assuming the shape of men, fell suddenly upon the thieves and began to beat them with clubs of *krodh* [anger]. At this time Asitamuni appeared and said, "O protectors, let the thieves go, for they will be freed from sin, and you will obtain great benefits. The protectors let the thieves go. The thieves said, 'O Bhagaván, we bow to the protectors.' Then Asitamuni replied, "You are very fortunate : those who beat you were the Vighnas [troublers] of Ayodhyá, who prevent wicked persons from entering it ; they have let you go on my account, you should, therefore, now perform the pilgrimage of Ayodhyá in due manner, which will remove your sins. Then the thieves asked in what way they should perform the pilgrimage, so as to secure places in heaven. Asitamuni answered, "Those who restrain their passions and do not commit sins, gain the full advantages of the pilgrimage. He who controls the passions and gives alms in proportion to his means, obtains these benefits. He who keeps the Muni fast, shaves at Svargadvár, bathes there, and visits the birthplace, is released from the sins of killing a cow and a bráhmaṇ, of cohabiting with the wife of a spiritual guide, and from many others of the same kind, and thus obtains salvation. On that day, men, Kinnaras, Gandharvas, and the gods, bathe in the Sarayú and visit the birthplace. You should also do the same ; proceed and you will see great wonders." Then Mahádeva said, "O Goddess, having spoken thus, Asitamuni disappeared, and the thieves were glad and entered the city."

Chapter IX.

Then Mahádeva said, "When the thieves entered Ayodhyá agreeably to the words of Asita, Ayodhyá, assuming a charming and beautiful form

appeared before them, in white clothes, accompanied by several maids, adorned with necklaces and armed with the S'ankha, Chakra, Gadá, and Padma. She is the beloved abode of Rámjí and the most ancient of all the sacred places. She is worshipped by all the Gods and the Munis who reside there. Thus the thieves saw what no one had ever seen before, and they were very glad. As sins have no power there, they lost their influence over the thieves, as will be explained. Ayodhyá advanced towards them with the Gadá, and the thieves trembled from fear. All of a sudden, the sins made their appearance, wearing blue clothes with horrible and dreadful faces, depressed noses, wearing iron ornaments, having red hair of different shapes, some blind, some one-eyed, and so on. Then Ayodhyá beat them with clubs, and compelled them to fly. They waited under a pípál tree outside the city, and made a horrible noise, which greatly astonished the people. Ayodhyá then called the thieves, who went to Svargadvár. It was the Navamí day, they bathed in the Sarayú, repaired to the Birthplace, kept the fast, and visited the place. Thus they were freed from all sins. At this time, Yama called Chitra-Gupta and said, 'The thieves have become pure, blot out their sins from thy book and forgive them; their sins have been destroyed by Ayodhyá, the first city of Vishnu. Here live those who require salvation. The thieves have become Vaishnavas. Then Chitra-Gupta became sorry, and said, "We have suffered much trouble in entering their sins, but it may be, as thou sayest, that we shall no more register the crimes of the wicked; for it is all in vain: the wicked go to Ayodhyá and obtain salvation and the vicious, in the Kali Yuga, become pure on visiting the Birthplace.' Having said this, they scratched out the sins of the thieves."

Then Mahádeva said, "O Goddess, the messengers of Yama, who wander about on earth, came to the pípál tree where the sins of the thieves stood crying and asked them, 'Who are you, whence have you come? what has brought you here, and what are you talking about?' The sins replied, 'There were five thieves in the country of Marakántár, very wicked, who nourished us and did not mind the orders of their parents, spiritual guides, the Vedas and Puráṇas.' They then related the whole of the rest of the above story."

Then Mahádeva said, "O Goddess, on hearing the words of the sins, the messengers felt compassion for them, and got angry with Ayodhyá, but unable to oppose her, they told them to stop there, as they would try their utmost to bring them again together with their friends (the thieves). After this, the messengers went to the place of Yama and said, 'You have made a great mistake.' Yama replied, 'You are not aware of the advantages of bathing at Svargadvár, keeping fast on the Navamí and visiting the Birthplace. I am quite unable to fight with Ayodhyá, let us go there.' Having

said this, Yama riding on a buffalo, and accompanied by Bhút, Párvati Pisácha [evil spirits] and Ganas, went quickly to Ayodhyá. Meeting Vis'vakarma near the city, he asked him, 'Where do you come from at this time on the day of Navamí?' Vis'vakarma replied, 'I come from Ayodhyá after bathing at Sargadvár and visiting the Birthplace, and have been ordered by Brahmá to repair to Sakait with the gods, and build houses there for the pilgrims of Navamí.' Hearing this, Yama advanced, relating the advantages of Ayodhyá to his servants. He first arrived at the Tons, and prayed to it with folded hands. Thence he went to the Guptár-Ghát, and sat down on the bank of the Sarayú, praising Ayodhyá."

Chapter X.

"Yama, having praised Ayodhyá as described above, solicited pardon for his sins. Ayodhyá then appeared, to please him. Yama bowed to her, upon which Ayodhyá said, "You are very wise, I am much pleased with you, ask for a boon, and let me know the object of your coming here." Then Yama replied: "If you are pleased with me, tell me the way by which the sins that stand under the Pípal tree outside the city, may be destroyed, and secondly, forgive the faults of our messengers." Ayodhyá said, "Remain on the bank of the Sarayú, which shall be known by the name of Yamasthala. It is called Jama-thurá by the people. Those who bathe here on the second day of the lunar half of Kártika, shall be free from your fear. Let the sins that stand under the Pípal tree be destroyed by my order." Having thus spoken, Ayodhyá disappeared. Yama then remained at the bank of the Sarayú, and Chitra-Gupta, and the messengers of Yama were greatly ashamed, and the sins were destroyed in a moment. Yama, having built his house there, went to his place, relating the benefits of Ayodhyá to his messengers."

Then Mahádeva said to the goddess, "I have told you the advantages of Ayodhyá, the Sarayú, the Birthplace, and the day of the Navamí. He who hears them, or relates them to others, obtains salvation in the end after having enjoyed all pleasures. What Agastya Muni said to Sutíkshna Muni I have related to you. This religious story removes the sins of one who is ignorant, the enemy of the Bráhmans, the spiritual guide of the Vedas, and of the Gods, provided he tell, read, and hear it in faith."

Then Párvatí said, "I shall now be glad to hear the advantages of the Kitchen of Jánakí." Mahádeva answered, "O Goddess, listen to its sin-destroying story. Her kitchen is always filled with articles of food; its mere sight accomplishes our wants. Its pilgrimage is performed at all times: no one can fully describe its benefits, but I will do so in a brief manner. The house of one who daily visits it, remains filled with victuals. On seeing it, Parasuráma was released from the crime of destroying the Kshatriyas. A

mere visit to it removes sins committed knowingly or unknowingly. It freed Balaráma from the sin of killing Sút. What more shall I say about it?—it is the bestower of all sorts of joy. It is situated north-west of the Birthplace. Forty yards north of the Birthplace lies the house of Kaikeyi, where Bharata was born. Sixty yards south of it is the dwelling of Sumitrá, where Lakshman and Satrughna were born. Their sight releases man from worldly ties, and gives salvation. South-east of the Birthplace is Sítákúp, which is also called 'Jūána-kúp.' Drinking its water renders a man intelligent. Brihaspati, Vas'ishtha, and Vámadeva drank its water, and attributed to it their dignity and prosperity.

South of Hanumat-Kunḍ is Suvárna-khánah, called Soná-khar by the people, where Kuvera showered gold from the sky. South of it is Sugríva Kunḍ, and south of that Bibhíshana Kunḍ. Pilgrimages to these places on the day of Navamí destroy all sins and bestow every kind of blessing."

Chapter XI.

Then Párvatí asked Bhagaván to tell her how gold was showered in the Suvárna-khánah, and what caused Kuvera to fear Rájá Raghu. Maháadev replied, "O goddess, this story strikes all with astonishment. There was a very powerful king of Ayodhyá in the family of Iksváku. He protected the world, and subdued a crowd of enemies. His name was well known in the three worlds, and he loved his people. The canopy of his glory surrounded the ten quarters of the globe; he reduced his foes to submission, amassed great wealth by his conquests, assembled a large army, conquered many Rájás, took tribute from them, and thus filled his coffers with innumerable treasures. Being at ease and leisure, he intended to perform a sacrifice at Ayodhyá. With this view he called Vas'ishtha, Vámadeva, Késyapa, Jábál, Bharadváj, Gautama, and other Munis, gave them suitable houses, and prayed: "O venerable sirs, I intend to perform a sacrifice, please tell me what sacrifice shall I perform." All the Munis replied, "O Maháráj, the Vis'va-jít sacrifice would be a suitable one, because you have conquered the three worlds. Do not delay." Mahárájá Raghu then performed the Vis'va-jít, and distributed his money among beggars. With the exception of his territory he kept nothing in the shape of money, and thus pleased the Gods, the Munis, and men. Thus he became as famous as Indra. At that time Kauto Muní, a disciple of Vis'vámitra Muni, learned fourteen sciences, and promised to pay in lieu fourteen krors of gold-muhurs. He compelled the spiritual guide to demand the above sum from him. A gold muhur is sixteen máshás in weight. He thought that no one but Mahárájá Raghu could afford so much money, and he went therefore to Ayodhyá. The Mahárájá received him with great respect; he had no gold left and used earthen vessels. Seeing the state of the Mahá-

ráj, the Muni was sorry, thought it improper to ask him for anything, and very unreasonable to put a man of such liberality to shame. He gently addressed the Mahárájá and said, "O Rájá, you have given all, it is useless for me to tell you what I have promised to pay my spiritual guide. What do you say to this?" Hearing this, Mahárájá Raghu became thoughtful, and requested the Muni with folded hands, to stop a day at his house, so that he might make some arrangement. The Muni did as requested. Raghu thought that as all the Rájás had paid their tribute, it was not right to exact more from them; he might therefore take something from Kuvera who had inexhaustible treasures. Accordingly he went to him. Kuvera, hearing of this through his messengers, was happy, and showered down gold in such quantities, that a mine of gold was formed. The messengers then went to the Mahárájá and reported to him what had been done, upon which he was pleased, showed the Muni the mine, and told him to take all the gold that was in it. The Muni took as much as he required, and left the remainder. Kauto then said, "O Rájá, you shall get a son who will increase the influence and dignity of your family; this Suvarna-khánah will be the bestower of every one's wishes. Bathing and giving alms here will bestow riches upon men. The pilgrimage is to be performed on the 12th day of the lunar half of Bais'ákh, and those who perform it will gain numerous advantages. A pilgrimage to it on the tenth day of the lunar half of Kártika will also bestow great blessings upon them. Having given this promise, the Muni went away. After this, the Rájá went to the house of the spiritual guide, and, to obtain his wishes, distributed among the Bráhmans the gold that was left, and continued to protect his subjects. O Goddess, thus did the mine derive its dignity from the Muni's boon."

Párvatí asked to tell her the cause why the spiritual guide had become so angry with Kauto Muni as to demand so large a fee from him. Mahádeva said, "O goddess, listen to what I am about to relate. Vis'vámitra Muni is a sage, and knows the past, the future, and the present. Once he performed a great devotion at his house, when Durbásá Muni came to him. He was very hungry and called out, "O Muni, I am hungry, give me something to eat, I want rice-milk." Vis'vámitra immediately brought a hot vessel full of rice-milk. Seeing him come with it, Durbásá asked him in gentle terms to hold it till he had bathed. Having said this, Durbásá went home, and Vis'vámitra, without feeling angry, stood firm like a peg, with the vessel in his hand for a thousand years, during which Kauto Muni remained in his service. At the expiration of the said period, Durbásá returned, found both happy, ate the rice-milk, and went home satisfied and praising them. Then Vis'vámitra, pleased with the services of Kauto Muni, taught him all the sciences and told him to go home. Kauto Muni requested Vis'vámitra to ask a fee; but he answered that his services,

were quite sufficient. Kauto Muni repeated the question and received the same reply. But he persisted in his request, upon which Vis'vāmītra got angry and said, "Pay fourteen krors of gold muhurs for learning the fourteen sciences." Kauto Muni replied that it would be paid. He thought that only Mahārāja Raghu could afford to pay such a sum; for he had conquered the world and performed the Vis'vajit sacrifice, and his wishes had been obtained. O Goddess, he who listens to the story which I have related, shall be freed from sin and get salvation. There is no doubt about it."

Chapter XII.

"To the south of the Suvāna-khānah is the Yajñavedi [the place of sacrifice], where S'ri Rāmachandra performed sacrifices. West of it is the Agnikūṇḍ [the fire altar], adorned with various jewels. Its light removes darkness, and devotees reside here. A man should put here three kinds of fire, Dakshinagni, Gārhapatya, and Ahavaneya and perform the pilgrimage to it in faith. Bathing, giving alms, and reading religious books here bestow great blessings. He who bathes at this place becomes immortal. This is beyond question. Giving gold, grain, clothes, cows with their young ones, and bathing here, confers riches. The pilgrimage to it is performed on the 1st of the dark half of Agrahāyana. The offering of *Pinds* (balls of flour or rice) here is equal to a Gayā Srāddha, and it blesses the deceased ancestors. Giving alms here is equal to performing an As'vamedha.

"South of Yajña Vēdi is the confluence of the Tilāi and Sarayū. To bathe, give alms, particularly grain, to fast and feed the Brāhmins here, is equal to performing the Achai Sautrāmani sacrifice. Merely bathing here makes a man healthy, and yields the benefits of ten As'vamedhas. By giving gold here, a man becomes virtuous and glorious. S'ri Raghunātha made this river famous. It is also called Tilodakī, because its water remains black as the seed of the sesamum. Bathing in the Tilodakī at the confluence destroys the sins of seven births. O Goddess, it is therefore proper for men to bathe in it and give alms here, because these benefits are everlasting.

"West of the Tilodakī and the Sarayū is As'oka Batkā, the garden of S'ri Raghunātha, in which various trees are planted, such as the sandal, agaru, kālāgura, fir, champā, naugkesar, mahua, kaṭhal, āsan, surtur, lodh, kadamb, arjun, ramnama, sutawar, vasanti, mundar, plantain, and other trees. Many flowers and fragrant trees are also found here, the colour of some being like gold, of some like silver, of some like fire, and of others black. There are several pools, ponds, wells, and cisterns, adorned with jewels and filled with clean water, on which the lotus and other flowers float. In the middle of it is a bungalow decked with beautiful artificial flowers, brilliant like the stars. It is better than the Nandana garden of Indra and the Chitra-

kútha of Kubera, because S'ri Raghunáthji enjoys himself here. There are many buildings and many seats, and upon one of the latter Rámachandra seated Jánakí with his own hand. The maids and male servants brought pleasant food and beverages to them. A great many Apsarás and Húris came to dance, and having partaken of the food began to sing. Rámachandra pleased all, and sat with Jánakí, as Chandramá does with Rohini, or the seven Munis with their wives. After this, he daily enjoyed himself with her, as Mahádeva does with Párvatí. In that orchard there is the Sítá-kunḍa, constructed by Sítá with her own hands. Rámachandra said that it should be the bestower of innumerable blessings. Listen, O Jánakí, I shall describe its advantages. The benefits of bathing and giving alms, and of devotion and sacrifice here, are everlasting. The pilgrimage is to be performed on the 4th of the dark half of Agraháyana, and destroys all sins. This Kunḍa is superior to all other sacred places. Bathing and giving alms here and worshipping Rámachandra with Jánakí, bestows salvation."

Then Mahádeva said, "O Goddess, hear the advantages of the other sacred places. West of Sítá-kunḍa is Vidyá-kunḍa, the mere sight of which confers all sorts of blessings. West of it is Vidyá-Píṭha, and south of it is Vidyá-Deví. He who bathes in the Kunḍ and visits the Deví, obtains salvation. Vidyá-Píṭha is also called Siddha-Píṭha, and is the bestower of knowledge. A man should worship the Píṭh-Deví, offer the sixteen prescribed articles, read mantras, and the following prayer: 'O goddess, he who worships thee and meditates on thee, obtains elephants for his vehicle; and becomes a Lokés'var (master of the world). He who thinks of thee without asking for anything, gains salvation.' Vishnu, Siva, the sun, Ġaṇes'a, and Deví are pleased with one who reads their mantras here, and make him prosper. Therefore it is necessary that one should worship here. The pilgrimage is to be performed every month on the 8th of both the wane and the waxing of the moon. Here a man ought to give grain and fruits and wash the Deví with milk. The Uchehátana, Mohana, Stambhan or Pryoga, are accomplished here. A pilgrimage, performed during the first nine days of the light half of Kártika, removes sins and bestows salvation."

Chapter XIII.

Then Mahádeva said, "O Goddess, south of Vidyá-kunḍa is Kharjura-kunḍa, which is also called Kharjohá. Bathing in it cures diseases such as the itch. Its pilgrimage is performed on every Sunday. West of Vidyá-kunḍa is the Maníparvat (hill of jewels) surrounded on all sides by creepers, and plants. The Tilodakí flows near it. The cause of the hill's being here, is as follows: Once Jánakí said to Rámachandra, 'I wish to enjoy myself on a hill, get me one, if you are pleased with me. Raghunátha replied, 'Very good'; then called Garuḍa and said to him, 'O king of birds, go towards the

North and bring the Maníparbat. Garuḍa went and brought the hill. He then asked where it was to be placed. Rámachandra replied : 'Place it west of Vidyá-kunḍ.' This was done, and Jánakí was pleased. Garuḍa asked permission, and went to heaven. Raghunátha then said to Jánakí, 'See, the hill is ready, take your companions with you, go there, and enjoy yourself.' Jánakí did so, and continued to visit it daily. The mere sight of the hill, destroys a mountain of sins and those of one thousand births.

"South of Maníparbat is Gaṇeś'a-kunḍ. A man should praise Gaṇeś'a with his mantra and give the sixteen prescribed things, and say the following prayer : 'Thy trunk is red ; thy face is beautiful ; thou fulfillest the wishes of thy devotees ; thou art a support of those who plunge into a sea of trouble ; thy belly is broad ; remain in my heart for ever ; thou seizest thy enemies with thy trunk, and throwest them up into the air, and thou blestest thy devotees.'

"West of the last is the Daś'a-ráth-kunḍ, very beautiful and adorned with jewels. It destroys all sins, and accomplishes all desires. West of it is Kaś'a-lyá-kunḍ, by bathing in which and giving alms there one obtains all sorts of joys. These pilgrimages are performed on the last day of Bhádra. West of the latter is Sumitrá-kunḍ, and south of it, Kaikéyí-kunḍ. The pilgrimage to both are performed on the 15th of Bhádra. South-west of it are the Dúrbhar and Mahábhar ponds. Pilgrimages thereto are performed on the fourth of the wane in Bhádra. A man who worships Vishṇu-Siva, and the Bráhmans here, obtains his wishes. Vishṇu and Siva have been here from time immemorial. Meditating on them destroys sins. O Goddess, their origin was this. Vishṇu and Siva were consulting with each other, when they smelled the perfumes of flowers which had been placed there by Dúrbhar and Mahábhar, who were brothers and used to sell lotus flowers. Both the gods were pleased, and said to the brothers that the two ponds would be called after their names, and men and women would bathe in them and obtain their desires.

"North-west of Mahábhar-kunḍ is Yoginí-kunḍ, where sixty-four Yóginís dwell. They all bestow great blessings upon men, but particularly upon women. Therefore it is necessary that they should bathe in it. The performance of a Puruscharana here gives riches.

"East of Yoginí-kunḍ is Urvashí-kunḍ, after bathing in which Urvashí went to heaven. Her story is as follows : A great Muni, named Raibha, was performing devotion on the Himálaya, when Indra sent Urvashí to disturb him. She was most beautiful, and had no equal in the regions of Indra. She came with spring and the god of love to the place of the Muni. The Muni looked up and was wounded by the arrows of love. He became restless and angry, and said, 'O wicked retainer of Kámadeva, you have come here, proud of your beauty to disturb me in my devotion ?—be ugly.' Hearing this, she became very sorry and falling to the Muni's feet said to him in be-

seeching accents, 'O Bhagaván, I am under the control of another, and have come by the order of Indra, please therefore forgive my fault, and tell me how to escape your curse. The Muni said, 'There is a sacred place, at Ayodhyá, situated east of Yoginí-kund, go and bathe in it, and you will recover your beauty, and the place will be named after you.' She bathed in the pond, and was restored to her former beauty; and the pond has since then been called Urvashí-kund. He who bathes here in faith and with due ceremony, obtains beauty. There is no doubt about this. The pilgrimage to this place should be performed on the third of the light half of Bhádra. One who bathes here, gives alms, and worships Vishnu, is sure to go to his regions."

Chapter XIV.

Then Mahádeva said, "O Goddess, east of Urvashí-kund is the charming Vrihaspati-kund, filled with innumerable flowers. It is the destroyer of sins and has pure water; and here he lived and performed sacrifices. Bathing and giving alms here frees a man from sin. Its pilgrimage is performed on the fifth of the light half of Bhádra. Here Munis worship, and the gods (such as Indra, &c.) obtain their wishes when bathing at this place. Bathing, going on a pilgrimage, and worshipping Vrihaspati and Vishnu here, cleanses a man of his sins. The bad effect of an impending unlucky day in a Kundli [horoscope], is destroyed by worshipping Vrihaspati here. One who forms an image of gold, dresses it in yellow silk cloth, and gives it to a Bráhmaṇ, is freed from falling into troubles.

"To the East of the last is the Rukminí-kund. Once S'ri Krishna-chandra came on a pilgrimage to Ayodhyá with Rukmini and Satyabhámá, and lived here a month. He daily bathed in the Sarayú and read the Mantra-ráj. Rukminí seeing a great many ponds here, built one of her own, where Vishnu resided. A man must bathe here, give alms, and worship the Bráhmaṇs with the Vaishṇava Mantra. A pilgrimage to it on the 9th of the dark half of Kártika, bestows a son upon a barren woman and riches upon the poor. This is beyond question. Men and women bathe here and enjoy themselves in this world and go to the regions of Vishnu after death. After bathing in the Rukminí kund and giving alms there, one should meditate on the form of Krishna in the following way—'Thou art dressed in yellow silk-cloth, and armed with the Sankha, Chakra, Gadá, and Sárang. Thou art the husband of Lakshmi. Nárada and other Munis constantly think of thee. Thou wearest a crown and bracelets and rings. Thou art adorned with the Kaushtubha Maní.* Thou art black as the flower of the linseed. Thy eyes are like the lotus.' By this meditation, a man undoubtedly obtains all his wishes.

* The name of a jewel.

“ North of Rukmini-kunḍ is the sacred place called Chírodaka; its water is like milk. Bathing here releases one from all sins. At some time, Das'aratha performed a sacrifice here, in order to be blessed with a son. At the expiration of the sacrifice, the being in whose name it was performed, appeared in a handsome shape, and holding a golden vessel filled with rice-milk. He gave it to the Maháráj, who, by the advice of the Munis, divided it into three equal parts, and gave one of them to Kaushalyá, the second to Kaikeyi, and the third to Sumitrá after dividing it into two parts. Ráma was born of Kaushalyá; Bhárata, of Kaikeyi; and Lakshman and Satrugna of Sumitra. The Bráhmans cooked rice-milk and washed it with the water of the pond, on which account it became white like milk, and the pond got the name of Chírodaka. By bathing at this place, one is certainly blessed with a son, and obtains all other wishes besides. Its pilgrimage is performed on the 11th of the light half of Kártika. Bathing, giving alms, and worshipping Vishṇu here, gives the above-mentioned benefits. The pond is called Chír-ságara by the people. West of it is Chíres'vara Mahádeva, stationed there by Mahárájá Das'aratha. A man is to worship him with the sixteen prescribed articles and read the following prayer—‘Thou livest at Kailas'a. Thy companion is Kuvera. Thou hast got the moon on thy forehead, and the Ganges in the tuft of thy hair. Thou enjoyest thyself in the woods of Kalpa-tree. I have worshipped thee with the leaves of a Bel-tree and water; forgive my sins.’

“ South-west of it is Dhanyáksha,* called Dhanaicha† by the people. Maháráj Harischandra here deposited a great treasure for the protection of which he stationed a Yaksha at this place. The Rájá caused Vis'vámitra Muni to perform the Rájasuya sacrifice, on which he became undisputed king. He here deposited innumerable treasures. The Yaksha named Pírmanthar protected the Treasury, called Pírmodé Anand, bestower of happiness, and was very obedient to the Muni, who being much pleased with him, told him to ask for a boon. He replied, ‘O Muni, I lived in the house of Kuvera and once stole perfumes, on which account he cursed me and said, ‘May thy body stink!’ The Muni took some water from the sacred place, threw it upon the Yaksha, and thus rendered his body perfumed. He stood up before the Muni with folded hands and said, ‘O Lord, by thy favor my body has become perfumed, therefore name this holy spot.’ The Muni replied, ‘Its name shall be Dhanaicha in the world, and it will be the bestower of beauty and wisdom. Bathing here will remove all stink, and by giving alms in proportion to his riches and worshipping Lakshmi, a man will obtain great wealth. Here a man should worship Mahá-Padma,‡

* A tribe of celestial beings.

† Place of great treasure.

‡ Names of the nine Nidhi or treasures.

Sankha, Makara, Kachchapa, Mukunda, Kunda, Níla, and Varchcha, because all these reside at this place. He should also give gold and grain publicly and privately, particularly on the fourth day of the dark half of every month. Pilgrimage, bathing, and libation of water here, satisfy all, from Brahmá to the smallest insect. Having said this, O Yaksha, people should throw water three times and gain salvation. By worshipping thee, the nine Nidhis, and Lakshmi, either out of or in the water, a man shall obtain great blessings, such as a son, riches, faith, knowledge, and salvation. Whoever from pride does not worship thee, shall forfeit the religious fruits of one year's devotion.' After saying this the Muni disappeared.

"West of it is Vishṇuhari, a celebrated shrine." Párvati said, "O Bhagaván, tell me what the cause is of its renown."

Chapter XV.

Mahádeva answered, "O Goddess, there was a Bráhmaṇ named Vis'va-s'arma, acquainted with the Vedas and religious principles, virtuous and much devoted to the worship of Vishṇu. He once came on a pilgrimage to Ayodhyá in hope of seeing Vishṇu and pleasing him with his devotion. He practised great austerity, kept fasts, and ate herbs, fruits, and roots. In Jyaisṭha and Āsáḍha, he sat before a fire; in the rainy season, in the rain; and in winter, in the water; and thus he bathed and worshipped Vishṇu with all his heart. He meditated on the sun, moon, and fire, which he made the Píṭha upon which he seated Vishṇu, dressed in yellow-silk cloth, with his weapons, and worshipped him with perfumes and flowers. He read the twelve-letter Mantra for thirty years, lived on air, and repeated the following prayer, 'O Bhagaván, animate and inanimate, spiritual guide, the best of mankind, the god of the gods, lotus-eyed, beyond thought, imperishable, master of sacrifices and the world, the destroyer of sins, endless, spoiler of births, having the lotus in the navel, bearing the garland of the seeds of the lotus, lord of all, destroyer of Kaitabha,* master of the three words, four-bodied Bāsudeva, Sankarshana, Pradyumna and Aniruddha, armed with the Chakra, parent of the whole world, protector of the people, lovely one, the father of fathers, thou art the articles of sacrifice; thou art the mantra; thou art the master of the sacrifice; thou art fire; thou art Varuṇa, armed with the Sankha, Chakra, Gadá, and Padma; supporter of the weak; holder of the Mandár hill; destroyer of Madhu; and husband of Lakshmi. Thou art Náráyana, Krishṇa, and Mádhava, be pleased with me.' Upon this, Bhagaván appeared, riding on Garuḍa, dressed in yellow-silk cloth, armed with the Sankha and Chakra, and said, 'O son, I am satisfied with thy devotion; ask for a boon.' Vis'va-s'arma replied, 'O Bhagaván, all my wishes are accomplished by thy visit, give me everlast-

* Name of a devil.

ing piety.' Then Bhagaván answered, 'May you have unchangeable devotion and obtain salvation. This place shall be named after you. You are very fortunate.' Having said so, Bhagaván struck the ground, and water gushed forth. He then washed the Bráhmaṇ with the water, and made him passionless, free from sin, and healthy. Hence, O Goddess, this holy place is called *Chakra-tírtha*. It is the destroyer of sins and the bestower of blessings. He who bathes here, goes to the regions of Vishṇu. Bhagaván again said to Vis'va-s'arma, 'O Bráhmaṇ, station the image of Vishṇu-hari here,' and it was done. Its pilgrimage is performed from the tenth of the light half of Kártika to the end of that month. Bathing at this place absolves men of all their sins and leads them to paradise. The Pitris (deceased ancestors) of a man who here performs the Pitri Sráddha go to heaven. This is beyond question. By bathing, giving alms in proportion to his means, and visiting Vishṇu, a man obtains salvation."

"O Goddess, I have described the advantages of *Chakra-tírtha*; north-east of it is *Vás'ishṭha-kunḍ*, the destroyer of sins. Here the great devotee and saint *Vas'ishṭha* and his 'chaste wife *Arundhatí* remain. The benefits of bathing at this place are great. A man should here worship *Vámadeva*, *Vas'ishṭha*, and *Arundhatí* in particular, and bathe and give alms. Its pilgrimage is performed on the 5th of the light half of *Bhádra*."

Chapter XVI.

S'ankara continued, "O Goddess, north-east of *Vás'ishṭha-kunḍ* is *Ságara-kunḍ*, the fulfiller of all our wishes. Bathing and giving alms here confers great blessings. Whatever benefit is gained by bathing in the sea on the last day of a month, is obtained by bathing at this place on any eastday. Its pilgrimage takes place on the last day of Kártika. By bathing and giving alms here, one obtains all desires and is freed from all sins.

"North-east of *Ságara* is the charming *Brahmá-kunḍ*, built by Vishṇu, who lives there and once performed a sacrifice in due form. He bathed with the gods in the kunḍ, which was filled with clear water, lotuses, water-lilies, and covered with geese, karandavas,* and *chakraváka*, and surrounded with beautiful trees. On seeing this, the gods asked *Brahmá* with folded hands, 'O *Pitámaha*, (father of all) tell us of the advantages of the kunḍ. *Brahmá* replied, 'Listen attentively. The kunḍ contains various fruit-trees. By bathing here, a man is released from all sins, obtains a handsome shape, and riding on a vehicle, yoked with geese, goes to the regions of *Brahmá*, where he remains, like me, till the general destruction. Bathing and giving alms here, gives the same benefits as the performance of an *As'va-medha*; consequently a man should bathe, give alms, worship, and sacrifice at this place; for this destroys capital crimes and confers ever-

* A kind of duck.

lasting blessings. Its pilgrimage is performed on the fourth of the light half of Kártika. The distribution of gold and grain, in proportion to a man's power, gives me satisfaction.' Having thus made known this holy spot, the bestower of salvation, Bráhmá, disappeared.

"North-east of Bráhmá-kund, at a distance of two hundred yards, is Ríṇa-mochan ('wiper-off of debt'), which is difficult of access to the wicked and unlucky. Its water joins that of the Sarayú, and its origin is this:—Once, on a pilgrimage, the Muni Lomas came here, and by bathing was freed from all debts, and cured of mental diseases. Feeling this, he was much surprised, and lifting up his hands, and shedding tears of joy, spoke in the following manner:—'Ríṇa-mochan is superior to all other sacred places, for bathing in it removes all debts. The three debts, Rishi Rin, Deva Rin, and Pitri Rin,* from which a man can only be freed by a Brahm charj sacrifice and by having a son, are destroyed by bathing in it. O people, I found out its glory in a moment! It is therefore incumbent on you, to bathe, give grain, gold, &c., through which you shall obtain all kinds of blessing.'

"Further east of this holy place, at the distance of forty yards is Pápa-mochan (sin-wiper). Its origin is this: There was a Bráhman named Narhar in the country of Páñchála, who, falling into the company of liars and wicked people, committed many crimes, such as killing Bráhmans and speaking against the Vedas. He once, with some virtuous men, came on a pilgrimage to Ayodhyá, and became absolved of his sins by bathing at this holy spot. Flowers fell on his head from the sky, and a beautiful vehicle descended, riding on which he went to the regions of the gods. From that time it became famous, and received the name of Pápa-mochan. Every one praises it. Its pilgrimage is performed in the dark half of Mágha. The fruits of bathing and giving alms here are everlasting and destroy all sins.'

Chapter XVII.

Mahádeva continued, "O Goddess, east of Pápa-mochan, and two hundred yards distant from it, is situated Sahashra-dhára, in the water of the Sarayú, and is called Lakshmana-kund. It destroys all sins. Here Lakshmana disappeared by the order of Rámachandra. Its origin is this: When Raghunátha had performed the business of the gods, Kál(déath) being sent by Bráhmá, assumed some shape, came and solicited him to disappear. While he was talking privately with Raghunátha, he took a promise from him to give up whoever entered the room during their conversation. Raghunátha ordered him to put Lakshmana at the door, to prevent any one from coming in. By the will of God, Durbásá Muni came and said to Lakshmana, I am hungry, go to Raghunátha and inform him of my arrival.' Lakshmana made several

* Debts of Munis; debts of the gods; debts of forefathers.

apologies, which the Muni did not accept; he was therefore compelled to enter, and to communicate to Raghunátha the Muni's request. Raghunátha took leave of Kála, came to the door, paid his respects to the Muni, and having given him food, dismissed him. Raghunátha became anxious and said, 'I have never told a lie, it is improper to break a promise. O Lakshmaṇa, it is now necessary for us to separate for some time and you must disappear. Lakshmaṇa obeying his order, went to the Sarayú, and intended to throw himself into it, when S'esha burst the earth in a thousand places, and made his appearance, by virtue of which the spot was called Sahashra-dhárá. Indra also came with the gods and said to Lakshmaṇa, 'You have performed the affairs of the deities, please come to my regions, S'esha is waiting for you. Lakshmaṇa then entered the river. This sacred place is fifty yards in extent. By bathing and giving alms here, the people will go to the regions of Vishṇu. He who will bathe and worship S'esha at this spot, will be free from sins, and obtain all his wishes. There is no doubt about it. Its pilgrimage is performed on the fifth of the light half of S'rávana. The fear of serpents is removed by the worship of S'esha on that day. By bathing here during the whole month of Vaisákha, a man remains krons of kalpas in the regions of the gods. To go to, and reside in, the place of Vishṇu, one should give a milch cow, clothes, and ornaments to a fit person. To please Lakshmi Náráyaṇa, and to obtain riches, men should worship Bráhmaṇs and their wives in Vaisákha, because all other sacred spots come and remain here during that month."

Mahádeva continued, "O Goddess, Indra having sent S'esha to Pátála (the lower regions) and accompanied by the gods, took Lakshmaṇa to his realms. From that time, this kuṇḍ has been called Lakshmaṇa kuṇḍ. It has a thousand streams."

Chapter XVIII.

Having heard the advantages of Lakshmaṇa-kuṇḍ, Párvatí was delighted and requested Mahádeva to describe other sacred places. Mahádeva replied, "O Goddess, south of Vidyá-kuṇḍ is Vaitaraṇi (the destroyer of sins) by bathing in which one does not go to Yáma-loka. Its pilgrimage takes place on the full moon day of Bhádra.

South of Vaitaraṇi is Ghoshárka, the destroyer of sins. By bathing and giving alms here one is sure to go to the regions of the sun. Bathing at this spot cures leprosy and other diseases. Its pilgrimage is performed every Sunday, on the sixth day of the light half of Bhádra and Mágh, on the sixth of the light half of Bhádra, if there be a Sunday on that day, and on every Sunday in Pausa. The origin of Ghoshárka is this: There was a king named Ghosha, of the solar race, who was very powerful, who protected his subjects, and whose renown had spread far and wide.

His glory was like that of the sun, and he conquered all his enemies. Having entrusted the management of his dominions to his ministers, he went to a thick forest to hunt, killed many deer, tigers, and pigs, and wandered about here and there. He felt thirsty and searched for water, when luckily he saw a pond. He had a wound on the hand, which the application of no medicine could cure. But no sooner had he touched the water of the said pond, than the wound healed. Seeing this, the Rájá was astonished, bathed in the pond, drank its water, and asked the Munis what pond it was. Being told that it was the Súraj-kund, he began to pray in the following manner, 'I bow to thee, O Sun, thou art Bhagaván, filled with grandeur; thou art the lord of the god of the deities; thou art Chid-átmá (formed of wisdom), S'avitá (creator of the universe); Ingad, Anand (bestower of happiness to the world); Pírbha-geha (full of pomp); Deva (resident in the hearts of all); Trimurti (personification of the three Vedas, Rig, Yajur, and Sáma); Virusvan (covering the world with glory); Yogajna (well versed in religious meditation); Purapur-rup (personification of the immoveable and moveable, from the gods to the insects); Karankarya (personification of cause and effect); Triloka-timirachehhid (destroyer of darkness of the three worlds); Achintya (beyond thought and speech); Parabrahm (essence of the world); Bháskara (maker of light); Yogi-priya (lover of those who know and act according to the Yóga S'ástra); Yogarúp (who can only be known through deep meditation); Yoga (opportune); Sadá-mam one who always resides in me; bestower of all blessings and free from pride; Yaga-mantra-rúp (personification of sacrifice, its mantras, and everything connected with it); Rogoghena (destroyer of diseases); Utsai pirsant (protector of devotees and destroyer of the wicked); master of the planets and great sacrifices; Priya-átmá (lover of the soul); and Pirkash-korak (gratifier of every one's wants)! I pray to thee, be pleased with me.' The Sun being satisfied with the prayer, appeared to fulfil his wants. The Rájá worshipped him, and stood up with folded hands. The Sun replied, 'O Rájá, ask whatever you choose, I will give it.' The Rájá said, 'Please remain at this place.' To this the Sun agreed, and said, 'Whoever shall read your prayer will obtain all his desires. This spot shall be named after you and me.' Having said this, the Sun disappeared. The Rájá became as glorious as the sun, and bowing to him, went home. He who bathes at this place, will go to the regions of the sun and obtain all his wants.

"West of Ghoshárka is R a t i - k u n d, the destroyer of all sins. Bathing in it, and giving alms here, gives beauty.

"West of that is K á m a - k u n d, the bestower of happiness, by bathing in which one becomes as handsome as Káma, and obtains riches and virtue. Its pilgrimage is performed on the fifth of the light half of Mágha."

Chapter XIX.

Mahádeva said, "O Goddess, west of Kúsumáyudha-kund is Mantres'vara Mahádeva, the bestower of great blessings which have no equal. There is also the Mantres'vara-kund, where one should bathe and worship Mantres'vara, which frees a man from the transmigration of his soul for millions of kalpas. Its origin is this: When Rámachandra, having performed the orders of the gods, was on the point of leaving this world, he read a Mantra, created the kund, and stationed Mantres'vara Mahádeva there; from that time it has been a famous place. In its northern part are planted lotuses, water-lilies, and Kulhar plants. He who bathes here, gives alms, and worships Bráhmans, goes to heaven for ever. No one can fully describe the advantages of Mantres'vara.

"North of it is Sítalá Deví; by worshipping whom, one is freed from sins. Her worship takes place every Monday. She is to be especially worshipped during small-pox epidemics.

"North of it is Bandi Deví, by meditating on whom a man is released from prison. A man who is thrown into a dungeon, or has offended a king, is freed from both of them by meditating and worshipping her. Her pilgrimage is performed on every Tuesday.

"North of that is Chuṭki Deví, by meditating on whom one obtains all his wishes. Snapping of the fingers (*chuṭki*), and lighting lamps here, bestows great blessings. Her pilgrimage is performed on the fourteenth day of every month. West of it is her kund, and the pilgrimage to it is made on the fifteenth of Kártika. Bathing and giving alms at this place takes a person to heaven.

"West of Chuṭki-kund is Nirmalí-kund, by bathing in which Indra was absolved of the sin of murdering Virtra Asur, and thence it is called by that name. By bathing and giving alms here, a man is absolved of capital crimes; and its pilgrimage is performed on the last day of Srávana.

"North of it is Gopirtar, where Vishṇu is stationed and is called Gupta-hari. In the beginning of Satyayuga," continued Mahádeva, "a battle took place between the gods and the demons, in which the former were defeated. Accompanied by the gods, I went to the sea of milk, where Vishṇu was sleeping on the hydra. Lakshmi was shampooing his feet; Nárada and others were praising him; and I thus began to pray, 'I bow to thee conqueror of Kál (death); devotees see thee in their devotion. Thou art the best of all, pure and free from ignorance. Thou art all the Vedas and Mantras. Thou assumest the shape of a goose, which separates milk from water, and then drinks it. Thou art truthful, nay truth itself. Thou art a mine of justice. Thou knowest everything, from the largest to the smallest. Thou art omniscient and all-seeing, the bestower of salvation, the place of un-

changeable wisdom, the destroyer of the wicked, and the treasury of riches. Thou descendest to the world to remove ignorance, deceit, and vice ; thou art the creator of illusion (*máyá*), matter, and the universe ; Mahárudra, S'esha, supporter of the earth, sleepless, creator of the lotus from the navel, from which Brahmá issued, and from him, the world. Thou supportest the earth and the water on the day of general destruction. Thou art cause and effect, the destroyer of the vicious, all powerful, and the life of all creatures. Thou assumest the shape of half lion and half man, to kill Hiranyakashiup and other demons. Thou art endless, the supporter and destroyer of the world, and the remover of darkness. Mind, Reason, and Wisdom do not come up to thee. Thou art invisible. There is no difference between thee and S'iva, and those who think so, go to hell, as is written in the Srutis and the Smritis. Thou art a Bráhman to explain the religious principles to the four castes, and art kind to the virtuous. Thou art separate from matter and salvation. In short, thou art both visible and invisible. Thy body is dark like the lotus, and covered with yellow clothes.' On hearing our prayer, Vishnu appeared, was pleased, and said, "I know what ye have come for, ye have been deprived of your houses by the demons, go ye to Ayodhyá, perform devotions, and I will increase your power, and ye will be able to overcome them.'"

Chapter XX.

Then Mahádeva said, "O Goddess, having thus told the deities, the rider on Garuḍa (Vishnu) disappeared, and coming to Ayodhyá performed great acts of devotion in secret, to increase their powers. Hence the spot is called Gupta-hari.

Listen now to the origin of Chakra-hari. At this place Sudarsana Chakra fell from the hand of Hari, whence it received the name of Chakra-hari. By visiting these two Haris, a man is freed from all sins. The gods also performed severe devotion, and after thus obtaining additional strength, defeated the demons in battle, recovered their houses, gained great wealth, and became happy. Headed by Vrihaspati (the spiritual guide of the gods), they all went to Ayodhyá to see Hari, and adored him with undivided attention, upon which Parames'vara appeared dressed in yellow silk cloth, and said—'O gods, ye have been fortunate enough to conquer your powerful enemies, why have ye now come here, tell me without fear and delay.' The gods, having got permission, replied, 'O Bhagaván, we have obtained all our wishes through thy favour, please remain always kindly disposed towards us, and protect us when attacked by foes.' Bhagaván said that he would do so, and added that this place would be called Gupta-hari. He who will bathe here and worship Gupta-hari will gain salvation, and by giving alms, go to heaven. One should give, at this holy spot, a cow with her young one, her

horns covered with gold, her hoofs with silver, her back with brass, her tail with jewels, and her body covered with a beautiful cloth, to a fit person, free from sickness and sin, because otherwise she will carry him to hell. By worshipping me without desiring anything, a man shall go to paradise, and salvation shall fall to his lot. It is therefore proper for ye to repair thither, bathe and worship Gupta-hari, because he is the bestower of riches, piety, and many other blessings.' Having said this, Bhagaván disappeared. The gods then performed the pilgrimage to Ayodhyá in due form, were pleased with its advantages, and remained there. The pilgrimage to Gopirtar is performed on the last day of Kártika.

"North of Gupti-hari is Gopirtar, the destroyer of all sins. By bathing and giving alms here, a man is not involved in misery. O Goddess, there neither has been nor will there ever be such a place. What Manikarnika is in Kás'í, Mahá-kál in Ujjain, and Chakravápi in Nímkhár, that Gopirtár is in Ayodhyá, because thence Rámachandra with all its inhabitants went to Sakaitun (parádise)." Párvatí asked how Rámachandra had carried all the residents of Ayodhyá to Sakaitun. Mahádeva answered, "O Goddess, listen to it attentively. When Raghunátha, having performed the work of the gods, intended to go to Sakaitun, which is his abode, all sorts of creatures, monkeys, bears, Munis, Gandharvas, &c., came to him to pay their respect, and said with folded hands—'We shall all follow you, for we shall die, if you go without us.' Hearing this, S'rí Raghunátha first spoke to Bibhíshana, 'O Bibhíshana, I have told you to reign in Lanká till the end of creation, and you know my words cannot be untrue, nor ought you to think so, therefore you had best go to Lanká; you are my friend, do not otherwise, nor answer me.' Then Rámachandra said to Hanumán—'Do not disobey me, remain in this world, tell the people of my story, increase my fame, and protect the pious.' He then turned to Dobind Mayind and said—'You have drunk nectar and are immortal, stop here and protect the princes of my family.' Afterwards he told the rest of the monkeys, bears, and Rákshasas to accompany him, and dismissed Bibhíshana and the others. Having done this, he called Vás'ishtha, his spiritual guide, and requested him to make preparations for departure to Sakaitun, which he did."

Chapter XXI.

Mahádeo continued, "O Goddess, having bathed and dressed in yellow silk cloth, S'rí Raghunátha performed the usual daily ceremonies, and, taking *kúsh*-grass into his hands, prepared to leave. He said nothing to any one, but went out of the city like the moon issuing forth from the sea. Lakshmí and Sarasvatí assumed human shapes, and went forth from his left and right arms respectively; the former, the goddess of wealth, and the lat-

ter that of wisdom. Weapons, such as the sword, bow, and arrows, appeared in form of men, and the Vedas as Bráhmaṇs. So also did Onkár, Gáyitrí, Svahá, S'raddhá, Vashaṭ, mountains, Munis, those whom Rámachandra respected, Bharata, Satrugṇa, Bráhmaṇs with their children and wives and servants, all the subjects, with purified hearts, clean clothes, and daubed with sandal, bears, monkeys, insects, worms, beasts, birds, scorpions, serpents, and aquatic animals, all freed from sins and sorrow. Thus they came to Svargadvára, bathed there, and began to move, conversing together. Seeing this the gods were struck with wonder. They went four and a half *kos* to the west of Svargadvára, and observing the Sarayú became very happy. The generous, great, and the father of all, Brahmá, with the gods, mounted on chariots, came gently through the air. Flowers were showered on Raghunátha and his companions, Apsarás danced, and Gandharvas sang. Brahmá said, 'O Rághava, leave the visible body and come with thy brothers; I cannot compel thee, do whatever thou pleasest. I alone know thee, thou art he to whom all go and in whom all find a resting-place. Thou art omniscient, the supporter of all, and the bestower of salvation. No one knows thee, devoid of Máyá, which thou hast produced to create the world. Thou art beyond thought, the essence of everything, the smallest and largest, and everlasting. Thou hast no superior; come to thy ancient residence with, or without, a body.' Rámachandra considered that as he had come from Ayodhyá, it was improper for him to go back, so he went to Sakaitun, where Vishṇu is worshipped. His companions followed him with their bodies without feeling the least pain, and enjoyed all blessings. All the gods praised them and went to their homes. The imprecation of Nárada, which was that Rámachandra should suffer from the separation of his wife, was fulfilled, and now Rámachandra became Vishṇu, and Sítá Lakshmi. Rámachandra then said to Brahmá, 'O Brahmá, point out a place for the residence of my followers, who have left their homes and relations; they are my devotees and are beloved by me. I could not allow them to die.' Brahmá said, 'Let them remain in Sántaloka (a name of heaven).' Those who leave this world, meditating on Rámachandra or Ayodhyá, or merely bathe at Gopirtár, will surely obtain heaven. All men, animals, insects, worms, birds, and other creatures, when bathing in the Sarayú, became beautiful and glorious, just as iron is converted into gold when it touches the philosopher's stone, and go to the regions of Vishṇu.

"Here, therefore, they went across the Sarayú without fear, like those who in crossing catch hold of the tail of a cow; hence the place is called 'Gopirtár.'"

Chapter XXII.

Mahádeva said, "O Goddess, a man is sure to get salvation at Gopir-tár; for there is no other sacred place equal to it. Those who bathe here go to heaven. Its pilgrimage is performed on the fifteenth of Kártika. Indra, the other gods, and all the sacred spots on earth come and re-side here during the month of Kártika, and are cleansed of their sins. Bathing, giving alms, according to one's means, worship and sacrifice, all bestow everlasting fruits. The sacred places being filled with the sins of the people, remain restless till Kártika, when they repair to it and bathing here, become all pure. To please Vishnu, one should feed Bráhmaṇs, and give a cow and grain in due form to a proper person. Lighting lamps here with ghí or oil of sesamum confers the same advantages as bathing at Kurukshetra during a solar, or in the Narbadá, during a lunar, eclipse, and weighing oneself against gold. He who gives a bead of gold here, goes to paradise, and whoever performs a sacrifice and bestows grain upon the poor, is freed from the transmigration of soul. Burning oneself in the fire, leads one to the place of Vishnu. Those who fast here never return to this world. The Sarayú flows from the eyes of Náráyana: who can describe its benefits? The Ganges rises from the feet of Hari, and a man obtains the fruit of an As'vamedha at every step which he takes towards it. What then shall I say of the Sarayú where Rámachandra daily bathes?"

Then Párvatí said, "O S'ankara, I have heard that Rájás Harischandra and Rukmángada carried Ayodhyá to heaven; tell me how." S'ankara answered, "There was a Rájá named Harischandra in the Tretá cycle, a descendant of Iksváku, celebrated for piety. Draught never visited his country, and no plague ever occurred in his land. The young did not die, the people were not irreligious, they were ever happy, and did no injustice for the sake of getting rich. This was the cause why he carried Ayodhyá to heaven. Another Rájá, Rukmángada, of the same line, had a son named Dharmángada, very learned, brave, and obedient to his father. He kept the fast of the eleventh day of every month in due manner at the advice of Nárada, and went to the regions of Vishnu with all his subjects. Rukmángada, mounting a celestial car, also went to that place."

Chapter XXIII.

Then Párvatí asked Mahádeva to describe the remaining sacred places at Ayodhyá. Mahádeva said, "West of Súraj-kunḍa is Durgá-kunḍa. Bathing here and giving alms and feeding the Bráhmaṇs, make a man obtain his wishes. The eight-armed goddess is stationed here. The pilgrimage is performed on every Tuesday and the eighth of every month.

"South-east of Súraj-kunḍ is Nuragráma, by bathing in which all sins are destroyed. South of it lies Náráyana-gráma, which has a

pond, by bathing in which a man is absolved of all his sins. The pilgrimage to these places is performed on the eleventh of the light half of Kártika.

"East of Súraj-kunḍa is Trepúrári Mahádeva in the vicinity of the Sarayú. By bathing in the Sarayú on the last day of Kártika and worshipping him, people obtain their wishes.

"East of it is Bilvahari, the destroyer of sins. Its origin is this : There was a very beautiful and young Gaṇḍharva who used to laugh at every one, and ill-use Munis, devotees, and Bráhmaṇas. Seeing this, Nárada cursed him, and told him to be a buffalo for a thousand yugas. But he solicited forgiveness, upon which Nárada ordered him to go and live in Ayodhyá, where he would obtain salvation on the birth of Rámachandra. Accordingly, he went to Ayodhyá, resided on the bank of the Sarayú for a long time ; and when he heard of Rámachandra's birth, he went to his house, and ascending a fine celestial car, repaired to heaven. He stationed Vishṇu at Ayodhyá, and called him by the name of Bilvahari. He who sees him is freed from the three kinds of debts, poverty or misfortune, separation from friends, and fear of enemies ; and he who bathes and worships Rámachandra and Jánakí here, will certainly gain salvation. Its pilgrimage is performed on the fifteenth day of Vaisákha.

"East of it is Válmíka Tírtḥa. It is related that a hunter named Dīpḍhir, from the Himálayas, once came to the Sarayú in pursuit of a deer, and, seeing a devotee, halted for three nights. The devotee released him from his sins, and the hunter spent a thousand years in devotion of the gods. He was reduced to a mere skeleton and covered with a Valmíka*. Some time after, Rámachandra came playing to the Sarayú, and seeing the Valmíka touched it with his hand, whereby it assumed a beautiful shape and went to heaven. Having observed this, Raghunátha asked him who he was. He told his story and with folded hands fell upon the ground. Raghunátha told him to rise, and by his order he mounted a chariot and went to Sakaitun. From that time the place was called Valmíka. Men who visit it are freed from the three kinds of debts. Visiting Valmíka, leads a man to Jana-loka ; bathing there leads to the regions of Vishṇu. He who offers here oblations, pleases his deceased ancestors and obtains the fruits of performing a s'ráddha at Gayá.

East of it is the sacred residence of Rishyasringa Rishi, who was married to Santají, the sister of Rámachandra. He lived here with his wife for a long time, and performed acts of devotion for the benefit of the people. He who bathes in the Sarayú and worships the said Muni, obtains his wishes. The pilgrimage to this place takes place on the last day of Kártika and the ninth day of the light half of Chaitra.

"South-west of it is Pohnari, where there is a pond, by bathing in

* A mound of earth raised by white ants.

which a man gains his desires. The pilgrimage to it is performed on every Sunday. By giving alms at this spot, one is cured of the sickness called pándu (jaundice). West of it is Bharata-kunḍa, a beautiful pond filled with lotuses, waterlilies and other flowers."

Chapter XXIV.

Mahádeva said, "O Goddess, by bathing in the Bharata-kunḍa a man is freed from all his sins. The advantages of bathing and giving alms here are everlasting. A man should give grain to the poor at this place, and give money and clothes to a Bráhmaṇ and his wife. North of it lies Nandigráma, where Bharata lived. He was passionless, obedient to Rámachandra, and protected his subjects. By visiting it, a man gains the benefits of living at Kás'í for a thousand manvantaras, bathing at Práyága for twelve succeeding years in Makara, performing a s'ráddha at Gayá, and visiting Jagannátha. The pond is adorned with beautiful flowers and trees which cast their shadow upon it. Performing the s'ráddha at this spot, pleases the deceased ancestors and the gods. The fruits of giving here gold, grain, clothes, cows, and lands, are everlasting.

"To the west of the tank is Kálk á, whose worship grants all desires. West of it is Juṭá-kunḍa, where Rámachandra and others were shaved on their return from conquest. By bathing here, a person obtains all his wishes. A man at Bharata-kunḍa should worship Bharata with his wife; and at Juṭá-kunḍa, Rámachandra, Lakshmana, and Jánakí. The pilgrimage to both these kunḍas is performed on the fourteenth of the dark half of Chaitra.

"To the west of Juṭá-kunḍ is Ajíta Vishṇu. He who lives on water or milk, worships Ajíta Vishṇu, sings and dances here, gains all his desires.

"To the east of it is Satrugṇa-kunḍ. The pilgrimage to it is performed on the eleventh of the dark half of Chaitra.

"North of Satrugṇa-kunḍ and south of Bharata-kunḍ is Gayá-kúp, the bestower of all desires. The deceased ancestors of a man who bathes here and gives alms, are released from hell and go to the regions of Vishṇu. The performing of a s'ráddha with parched grain, sweetmeat made of flour, *ghí* and sugar, pancake, rice milk, oil, and molasses, which ever of these the pilgrim may be able to afford, satisfies the Pitris; it is therefore necessary for a man to do so, because thereby he obtains many sons, riches, and other blessings. The s'ráddha should particularly be performed on the 15th day of a month, if it be a Monday.

"East of it is the sacred place Pis'achamochan, by bathing in which and giving alms there, a man is never affected by the power of ghosts; s'ráddhas should also be performed here. The pilgrimage is performed on the fourteenth of the light half of Agraháyana.

“East of it and of its the vicinity is *Manus*, also called *Punnibás*, by bathing in which a man gains his wishes and is absolved of his mental, bodily, and oral sins. The pilgrimage to it is performed on the last day of *Bhádra*.

“South of it is the *Tons*, bathing in which destroys all sins. On its banks are situated the charming abodes of *Munis*, such as *Mándukya*, which grant all desires and destroy all sins.”

Chapter XXV.

Mahádeva then said, “O Goddess, the *Tons* rises from a place in the forest of *Pramodak*, a very sacred spot, adorned with various beautiful trees, by visiting which a man is released from his sins. Different kinds of birds perch on the trees, and sing harmonious songs, which destroy the sins of the hearer and give them pleasure. Its water is very clear and wholesome. In the forest, *Mándukya Muni* performed devotion, and thus made it sacred.

“East of it is the holy residence of *Gautama Rishi*, and east of that, is the abode of *Chavana Muni*, the mere sight of which destroys all sins. There are a great many trees which adorn the banks of the *Tons*, and are used as pillars of sacrifices. The pilgrimage to it is made on the last day of *Agraháyana*.

“On the other side of the *Tons* and near *Dhugdes'var* is *Sítá-kunḍ*, the destroyer of all sins and bestower of our wishes. The pilgrimage to it is performed on the fourteenth of the light half of *Bhádra*. In the vicinity of it is *Ráma-kunḍ*. There is no limit to its advantages, they could not be described in a hundred years. The benefits of bathing here are equal to those of giving grain, clothes, carriages, gold, land, villages, and cows. Listen to an ancient story. There was a *Bráhmaṇ*, named *Brahmadatta*, well acquainted with the *Vedas*. He performed acts of great devotion by living on vegetables of spontaneous growth, fruits, and roots. He made pilgrimages to the *Ganges*, *Yamuná*, *Gomatí*, *Gaṇḍakí*, *Satadrú*, *Payoshini*, *Chandrabhágá*, *Sarasvatí*, *Narbadá*, *Sona*, *Prayág*, *Gayá*, *Vindhya Tírtha*, *Himnut Tírtha*, *Breshurvana*, and other sacred places, such as *Nímkbár*, *Pushkara*, *Kurukshetra*, &c., in due form. Having performed these, he came to this pond, was pleased with it, bathed in the *Ráma-kunḍ* and the *Sítá-kunḍ*, meditated on *Rámachandra*, breathed his last, and riding on a celestial car went to heaven, attended by *Apsarás* and *Gandharvas*. Reading or hearing the above story leads a man to heaven.

“South of that is the abode of *Bhairava*, the mere sight of which destroys all sins. He was stationed here by *Vishṇu* for the protection of *Ayodhá*. The pilgrimage to it is performed on the eighth of the dark half of *Agraháyana*, and bestows great blessings. A man should offer to him sacrifices of animals and worship him, which will fulfil all his wishes. Having com-

fortably resided at Ayodhyá, Bharata went to pay his visit to Bhairava and built a temple for him."

Chapter XXVI.

Then Mahádeva said, "O Goddess, at that time there appeared a cow, from the teats of which sweet milk spontaneously issued. It fell upon the ground, on seeing which monkeys and bears were struck with astonishment, and asked S'ri Raghunandana, what the cause of its appearance was. Rámachandra answered, 'You should ask the spiritual guide Vásisht̥ha this question.' They then went to him, headed by Raghunátha, and requested him to reply to the point in question. After some meditation, he said that the cow had come for their sake, and that the place where its milk had fallen, should in future be called Kshira-kunḍa. Kshires'var Mahádeva had appeared in it, pleased with him because he had subdued his enemies and performed the work of the gods; he should therefore worship him with Jánakí. Raghunandan worshipped the image as told by Vásisht̥ha, and from that time it has been called Dughdes'vara, and the kunḍa, Sítá-kunḍa, because it was built by her. He who visits Dughdes'vara and bathes in it, is absolved from his sins; and he who worships Sítá, Ráma, Lakshmana, and Dughdes'vara here, obtains his wishes. The pilgrimage to it is performed on the fourteenth of the light half of Jyaisht̥ha. He who performs it goes to heaven, and is freed from all kinds of grief.

"To the east of it is Sugríva-kunḍ, near which is Shabh, where by bathing, giving alms, and worshipping Ráma, a man gains that very day his desires. East of it is Hanumat-kunḍa, to the west of which is Bibhishana Sar. A man by bathing in both, giving alms and worshipping Ráma here immediately obtains his wishes. West of it is the abode of Ástika Muni, by visiting which one is freed from the fear of serpents. In its neighbourhood is the residence of Ramanika Muni, the mere sight of which destroys all sins.

"West of that is the kunḍ of Ghritáchí Apsará in the water of the Sarayú, like that of Nirmala. In former times, there was a devotee named Vatsa, who wandered about on the Himálaya without food, and restrained his passions. Indra saw him and became jealous, lest he might seize his throne, and sent Ghritáchí Apsará to disturb him. The Muni saw how adorned she was with beautiful clothes and costly ornaments, became restless, and in his anger cursed her. He said, 'Thou art proud of thy beauty and disturbest devotees, go and be ugly!' Deformed through the curse she fell to his feet, and solicited him with folded hands, and spoke thus—'Have pity on me and forgive my fault, I am not independent; I have come here at the command of another; tell me, therefore, how I may be released from your curse.' The Muni replied, 'There is a kunḍ at Ayodhyá, in the water of the Sarayú, west

of the residence of Kurunaka ; go and bathe in it, and thou shalt be restored to thy beauty, and the kuṇḍ will be named after thee.' She did accordingly, and became beautiful again ; the kuṇḍ has, since then, been called Ghritáchi-kuṇḍ. He who bathes in it, in due form, obtains beauty either in this life or afterwards. There is no doubt about this. The pilgrimage to it is performed on the fourteenth of the light half of Pausa. To worship Viṣṇu here is proper.

" West of it, at the distance of four miles, is the confluence. By bathing in it, a man obtains the benefits of performing a thousand As'va-medhas, a hundred Vájapeyi and many Rájasuya, and of bathing at Kurukshetra during an eclipse of the sun. He who bathes here on the twelfth, fifteenth, and last days of a month, and during eclipses, undoubtedly goes to heaven. The benefit of bathing at this spot on the last day of Pausa, is greater than that of standing on one leg for a thousand years, and hanging with the feet upwards and head downwards for ten thousand years. Ten millions of sacred places assemble here on the twelfth of every month, and the fruits of visiting all of them are, therefore, obtained by once bathing here on that day. Bathing at this place always confers blessings, but particularly in Pausa, when all, whether Bráhmans, Kshatriyas, Vaisyas, or even bastards, obtain heaven and are freed from the transmigration of souls. Lighting lamps at the confluence, in due manner, during the month of Pausa, destroys the great and small sins of many births, just as fire destroys a heap of cotton, and bestows long life, health, wealth, and high rank. By keeping up the whole night, remaining pure, restraining the passions, causing fire-sacrifices to be performed by Bráhmans, worshipping Viṣṇu, hearing religious stories, such as the Gítá, &c., which please Bhagaván ; bathing at early dawn at the confluence in due form, giving gold, grain, clothes, cows, and horses on the fourteenth of the light half of Pausa, one obtains salvation and goes to the place of Viṣṇu. By bathing here, a man gains the fruits of making the annual pilgrimages of all the sacred spots. In the early part of the Satya Yuga, Bhagaván became incarnate in the shape of a boar, killed Hiranyáksha, cleared the earth of wicked men, came and lived here, and built a shrine. The Gods and Gandharvas and Munis, filled with joy, thus began to pray :—' O Varáha, we bow to thee, thou art the lord of the deities, omnipresent, the destroyer of the fear of thy devotees, all-powerful, thou killedst demons with thy teeth, perservedst religion, and gavest a present to the sea.' On hearing the above, Varáha asked, ' What is your request, tell me now at this place, which bestows salvation on my devotees.' The Gods said, ' O Bhagaván, if thou art pleased with us, grant that whoever bathes at the confluence, may be released from the dread of his enemies, from separation from his friends, and from re-entering the womb of a mother.' Varáha answered, ' Be it so, the confluence will be the de-

stroyer of sins, and the bestower of wealth, justice, love, and salvation.' After this, the Gods, Gandharvas, and Munis settled here."

Chapter XXVII.

Then Mahádeva said, "O Goddess, west of Varáhakshetra is Jambú Tírtha, the giver of all wishes, by bathing in which a person is freed from the crime of killing a Bráhmaṇ. Its origin is this: A jackal once went to the house of a Bráhmaṇ, named Devasarva, the sight of which made him good.

"Near it is the residence of Tundáluk Bráhmaṇ. He who visits it and performs sacrifices here, scares away poverty, and goes to heaven. There was a Bráhmaṇ called Tundala (fat), very greedy, and clad in the bark of trees, who was involved in debts, and suffered great distress. He once came to the bank of the Sarayú, and seeing a charming spot, stopped there for three successive nights without sleeping, and then bathed. This released him from debt and restored him to health, and thus he went to heaven. Those who bathe in the Sarayú near his abode are sure to obtain salvation through Bhagaván's favour.

"South of it lies the Agastya Sar. Bathing here, giving alms, performing sacrifices and worship, and fasting and keeping up for three successive days and nights, yields the fruits of an Agnishtoma Yága, without fasting; but he who lives upon vegetables, roots, and fruits, is freed from all sins whether committed in childhood, manhood, or old age."

"Mahádeva said, "O Goddess, listen now to the names and the advantages of the sacred places that lie on the northern bank of the Sarayú. First, Pana Shur, by worshipping which, after bathing in the Sarayú, one obtains all his wishes. This is beyond a question. Secondly, Gokula Nagarí, in which there is a holy pond, and near it is the temple of Lakshmi. He who bathes in the pond, adores Lakshmi, gives alms in proportion to his riches, and performs oblations, will obtain wealth. There is no better place of worship for the acquisition of riches. The pilgrimage to it should be made on the eight of the light half of Bhádra. Thirdly, Sapnes'varí Deví resides at her place, and informs a man in dream, whether his desires are to be fulfilled or not. The pilgrimage to her place is performed on the eighth and fourteenth of every month.

"East of that lies the Srotas river, and the Katlá (crooked) joins it. Bathing at the confluence and giving alms there in due form destroys all sins, especially on the last day of Kártika."

Chapter XXVIII.

Then Mahádeva said, "O Goddess, at the confluence is a sacred spot, called Champakapura, the destroyer of all sins, where there was a disciple

of Guler Muni, who was very learned and obedient to his spiritual guide, whose daughter he had married. She became pregnant, and when once at midnight he read the Vedas, the child in the womb spoke and said, 'It is improper to read the Vedas at this time,' which so offended him that he cursed the child, and said, 'May thy eight limbs be deformed!' In due time the wife gave birth to a boy who, though its eight limbs were deformed, was yet a very fine child. One day, he asked his father's permission, went out to perform his devotions, and set out for the Yamuná, where he worshipped. He was engaged in devotion when by chance fourteen hundred daughters of the great Rájá Mándhátá came to the place. They laughed at the devotee; and angry at their impertinence, he said, 'Be ye, too, ugly and deformed! When they returned home, their father was surprised at their deformity, and asked them the cause of it. They replied that they were under the curse of the devotee. The father told them to go to Ayodhyá and visit Kátalá Deví. They did so, and were restored to their former beauty. The pilgrimage to this place is performed on the ninth of the light half of Chaitra.

North-east of Kátalá is Manorama, the bestower of all our wishes, where the renowned Rájá Das'aratha performed a sacrifice to obtain forgiveness of sins. He was successful, made an As'vamedha Yága, fed a great many Bráhmans, and gave alms. Here the Gods, Gandharvas, and Munis perform devotion to gain their wishes. Its pilgrimage is performed on the last day of Chaitra. Oblations in honour of the deceased release them from hell, and carry them to heaven.

South-east of Manorama is Ráma Rekhá, formed by Rámachandra with his bow for the sake of giving his cows water. He who visits it, does not go to hell, and bathing in it destroys all sins. Men, animals, birds, insects, and worms that die here, go to the regions of Vishnu. Those who see this river, will gain riches, age, health, a son, a wife, a grandson, fame, wisdom, and other blessings. A Bráhman will gain spiritual knowledge; a Kshatriya victory; a Vaisya, wealth; and a S'údra, worldly comforts. Its pilgrimage is performed on the third day of the light half of Chaitra. West of Ráma Rekhá is the Sarayú, bathing in which frees all from sins."

Chapter XXIX.

Párvatí said, "O Mahádeva, relate to me more of the advantages of Ráma Rekhá." Mahádeva replied, "Listen attentively, for merely hearing my story destroys the sins of all former births. The Gods, Gandharvas, Yakshas, Kinnaras, Navas, Nagas, Gohink, Siddhas, Gerah, Nakshatras, Lokpálas, Dikpálas and Brahmá once came to Ayodhyá to bathe at the Ráma Ghát on the birthday (anniversary) of Rámachandra. They all became pure,

and settled where as invisible beings. There was a great assembly of the people at the Ghát, and some person went to Vas'ishtha Muni and asked him the cause of it. He said that it was Rámachandra's anniversary, when bathing in the Sarayú and worshipping him, destroys all sins and releases men from returning to a mother's womb. Hear, O Goddess, some of the advantages of this holy spot as described by the Muni to the inquirer. On the day of Ráma Navamí, a peacock accidentally came to Ráma Ghát with a serpent, which fell from its beak into the Sarayú, assumed a beautiful shape, with four arms, and riding on a celestial car went to heaven, in presence of the whole assembly. Drums beat in the skies and flowers were showered down. The Rishis were struck with astonishment. Ráma Ghát is also called Ráma Kunḍa. Nárada said to the Rishis, 'This is the benefit of bathing at the Ghát.' Hearing this, they did as they were told, became four-armed, and went to heaven. Those who listen to this story obtain salvation, and their deceased ancestors are satisfied. All the qualities in a man, such as truth, purity of heart, fondness of the Vedas, reading religious stories, knowledge, wisdom, good behaviour, mercy, humility, and simplicity are unprofitable, if he do not visit Ayodhyá. Even to cherish the wish to go to Ayodhyá is commendable. The advantages of the Ráma Navamí are everlasting. One gains heaven by daily praising Ayodhyá early in the morning. All good actions are inglorious unless a man see Ayodhyá, just as the day is useless without the sun, and the night without the moon."

Párvati said, "O Mahádeva, you have related to me the fruits of visiting the sacred spots in Ayodhyá, describe those of the city itself." Mahádeva answered, "O Goddess, those who perform the pilgrimage to Ayodhyá bodily, mentally and orally, gain all advantages. They should first purify their hearts, and secondly visit the sacred places outside." The goddess asked how the first could be done. Mahádeva replied, "By speaking the truth, shewing mercy, restraining the passions, and by wisdom, fasting, and devotion."

Chapter XXX.

As there are pure, indifferent, and impure parts in the body, so are there water and fire on earth. Those who perform acts of both internal and external devotion as mentioned before, are sure to go to heaven. The chief thing in worship is to be pure-hearted. The animals in the water are born and die in it, but they do not get to heaven, because they are not pure-hearted. An impure heart is attached to the passions of the body, to house and wife, and son, and friend, and wealth. A pure heart is one which is free from these things and loves Vishnu. Bathing in water does not purify the heart, just as a wine-vessel is not pure, be it ever so clean. He who bathes, gives alms, makes sacrifices, prays with a pure heart, lives in a sacred

place, and daily reads the Vedas, obtains the full benefits of virtue; but wherever he may reside, he must restrain his passions, deal fairly, and love Vishnu, whereby he will gain the advantages of living at Kurukshetra, Nímkhár, and Prayága. He who bathes at Svargadvára and Sahast Dhara, and visits Dharma-hari, the Janmasthan, Chakra-Tirtha, Brahmá Kund, and Rímochan on the eleventh of every month, obtains salvation, and is absolved of his sins. Ayodhyá is an excellent place, and there is no other equal to it.

“Hear the names of other places than Ayodhyá that also give salvation, *viz.* Brahmá's seven rivers:—the Son, Sindh, Hiran Naksh, Kokh, Lohita, Ghághrá, and Satadrú; three Grámas:—Saligrám, Sambhalagráma, and Nandi-gráma; seven towns, *viz.*, Mathurá, Haridwár, Kás'i, Kánci, Ujjayini, and Dvárká; nine forests:—Dandak, Samdhaka, Jambú, Marg, Pushkara, Utpaláranya, Nímkháran, Kurujangala, Himvan, and Urhad; nine *Ukhars* (waste lands):—Rainuku, Shukur, Kás'i, Kál, Kálinjar, Mahákál, Káli, Vat and Es'var; fourteen *Gohiyas* (concealed places):—Kokh, Kubya Arhud, Mankarm, Vat, Saligrám, Shukar Dvárká, Mathurá, Gayá, Nishkriman, Haridwár, Lohargul, Svayam Pirbhás, Maluo, and Badri. Bathing in the Ganges is necessary, frequenting the company of the virtuous, giving cows, meditating on Hari, feeding the poor, and listening to the Puránas. The Munis say that the company of the virtuous stands highest: it destroys sins, and bestows wisdom and faith. The mere sight of Ayodhyá confers the same benefits as frequenting the company of the virtuous.”

This Máhátmya has no parallel. Whoever reads it or hears it, goes to heaven. Every one should worship Bráhmans and Vishnu, and give gold to the former. Those who recite this Máhátmya should receive grain, clothes, gold, cows, and money, which bless the giver in this world and in the world to come. All kinds of devotion yield numerous benefits, when the devotee pays Bráhmans in proportion to his means. When listening to this Máhátmya, a man gains sons, wealth, knowledge and salvation, whatsoever he wants, and is sure to go to heaven.

Notes on Manipuri Grammar.—By G. H. DAMANT, B. A., C. S., Cachar.

The grammar of the Manipuri language is practically unknown at present, and the Europeans who have any acquaintance at all with it might be counted on one's fingers. So far as I know, there is only one book on the language, an English-Manipuri dictionary, printed at the Baptist Mission Press in 1830, and this is now very scarce. The language is to a certain extent a written one, and formerly had a character peculiar to itself. Manuscripts in this character still exist, and it is even now used

in Manipur for genealogies and family records, but all ordinary business matters are carried on either in Bengali or in Manipuri written in the Bengali character. I may note that all grammatical forms given hereafter are derived from the language as spoken at present, and not from the manuscripts, which, I am told, contain many obsolete forms, and indeed are hardly intelligible to an ordinary Manipuri. The grammar is very well worth studying; and as it contains many peculiarities which are found as well in the allied dialects of the Kookies and the Koupuis, a tribe of Nágás who inhabit parts of Manipur and Kachhár, it seems probable that the language of the Lushais and several of the Nágá tribes may be derived from the same stock. But we hardly know enough of these dialects to pronounce an opinion yet; however even if we grant that they are originally branches of the same stem, they have varied so much that they are now distinct languages and not mere dialects, and a knowledge of one is of very little use in learning another, a Kookie speaking his own language cannot be understood by a Nágá, or a Manipuri by either.

One of the first peculiarities which strikes one is the double possessive which is prefixed to certain nouns; thus—

aigi ipâ	my father
nangi napâ	your father
mâgi mapâ	his father
aigi ikok	my head
nangi nakok	your head
mâgi makok	his head

In these words the possessives *i*, *na*, and *ma* are prefixed in addition to the usual forms *aigi nangi*, and *mâgi*; *pâ* is of course the Manipuri for father in the abstract, but practically it is never used except in the forms *ipâ*, *napâ*, and *mapâ*. This peculiarity is as a rule confined to words signifying relationship as mother, brother, sister, and the like, and to those which signify a part of the body as hand, foot, &c.; and it is also used with a few words in very common use, as *yûm* a house, *pot* a thing. It is not generally used with words of two syllables, but there are exceptions, as 'aigi iraipâk' my country, instead of 'aigi laipâk.' These are general rules only, for nothing but constant practice can teach precisely in what words it should or should not be used.

The Kookies use *ka*, *na*, and *a* in the same way; *e. g.*,—

kapâ	my father
napâ	your father
apâ	his father

but they carry it a step farther than the Manipuris, for they apply it even to verbs; as:

ken kamoyi	I have seen
nang namûm	you have seen
amâku amuye	he has seen

Verbs.

The conjugation of the Manipuri verb, in its primary form, is simple enough, but is rendered somewhat difficult by the number of verbal forms, such as participles, and also by the great differences in the negative and interrogative forms.

The verbs are nothing more than a series of roots to which terminations are attached in the simplest way. Thus the root *chat* signifies "go", *chá*=eat, *pâm*=love, *hai*=say; but these roots are never found alone in this form except in composition, in such words as *tâningbâ*=wishing to hear where *tâ*=hear, *ning*+the termination *bâ*=wishing. The forms in common use, which are nearest the original roots, are *chatpâ*, *châbâ*, *pâmbâ*, *haibâ*, &c. They are nothing more nor less than verbal nouns, whether adjectives or substantives, though more generally used as adjectives or to qualify a sentence, as *khul asidâ laibâ*, residing in that village. These forms in the feminine are changed into *pi* and *bi*, as *yâmnâ phojabi nupi*, a very beautiful woman; *atumbi koubi nupi*, a woman called Atumbi. The forms *pâ* and *bâ* are the same, the change being merely for the sake of euphony. In the same way *t* and *d*, *l* and *r*, and *k* and *g*, are constantly interchanged.

We may distinguish six different tenses—a present terminating in *li*, or *ri*; a future in *kani* or *gani*; an imperative in *si*; and three past tenses terminating in *le* or *re*, *lûre* or *rûre*, and *lammi* or *rammi*. The latter refers to a thing done some time ago. It is a kind of aorist. The form in *lure* refers to something done just now, it might be called imperfect, and the form in *le* is a simple past and resembles the perfect: it answers to such forms as, went, did, saw, in English.

The forms in *le* and *lure* seem to be often interchanged. In giving names to the tenses, I have done so more to distinguish one past tense from another than with any other object, as I do not mean that the perfect, imperfect, and aorist, are exactly represented by the tenses here given, but there is a considerable resemblance.

The participles are perhaps the most difficult part of the verb. There are no less than ten different forms, and it is often no easy matter to know which form should be used. There are two present participles ending in *dana* and *kîdana*. There appears to be little if any difference between them; for they are used only with the present and imperative tenses, as 'go there and see him', *âsikâ chattana* (or *chatkîdana*) *mahâkpoo yengu*.

The past participles are two, ending in *ladana* and *lûdana*. They are only used in reference to an action which is completely finished, and there

appears to be little difference between them. They are only used in conjunction with a past tense, *e. g.*, when I went there, I saw him, *ainá ásiká chatlúdana mahakpoo ainá urammi.*

The future participle ends in *lagá*. It is said to be used only with the first person, the present participle in *dana* being used in its place with the other persons, but there appears to be some doubt about this.

'When I go there I will see him', *ainá ásiká chatlagá mahakpoo uganí.*

The next participle ending in *abadi* is used with the future to imply a doubt, whereas the form in *lagá* implies a certainty or fixed intention. 'If I go there, I will see him', *Towning amasung ainá ásiká chatlabadi mahakpoo ainá uganí.*

The form in *kadabagi* is used to express a purpose, but only in the first person, as 'I am preparing to go', *ainá chatkadabagi touri.*

The form in *nanabá* is used in exactly the same way, but only in the 2nd and 3rd persons, as, 'you make preparations to go', *nang chatnanabá tourang tou.*

The participle showing time is formed by adding *lingaidá* to the root. It means at the time of doing a thing, as 'when I was going there, I saw him', *ainá ásiká chatlingaidá mahakpoo ainá urammi.*

The last participle is formed by adding *paniná* to the root, and its meaning is 'from having done so,' 'because I have done so.' 'From having gone to that place I know all about it', *mapham ásiká aina chatpaniná pumnamak ainá kangí.*

The causal form is made by the addition of *hal* to the root, thus *kangbá* = to know; *kanghalbá* = to make to know. This form is conjugated in the same way as an ordinary verb.

The general rule for the formation of the negative is to insert *da* or *d* between the termination and the root; but the *d* is in some tenses inserted in the middle of the termination, and in the present tense the termination *li* is changed into *loi* in the negative. The formation will be more clearly understood from the conjugation given hereafter, as there are considerable variations in some tenses, for which it is difficult to lay down exact rules.

The Kookies insert *hi* in much the same way; thus 'I will see', *ken vengè*; 'I will not see', *ken vehingè*; 'see', *ven*; 'do not see', *vehiin.*

The interrogative is always denoted by the syllable *rá*, which is varied in different tenses into *drá* and *brá*, but this will be more clearly seen from the conjugation given. The interrogative *rá* is often used without a verb, and is simply attached to a noun substantive, in such phrases as 'is this woman your sister?' *Nupi asi nangi nachal rá?* Where *rá* is attached directly to the substantive *chal* without the intervention of any verb.

The conjugation of the verbs in the plural is in all cases exactly the same as in the singular.

Conjugation of the verb chatpâ, to go.

PRESENT TENSE.

I go	Ai chatli
You go	Nang chatlu
He goes	Mâ chatli

FUTURE.

I will go	Ai chatkani <i>or</i> chatke
You will go	Nang chatlu
He will go	Mâ chatkani

IMPERATIVE.

Let me go	Chatsi
Go	Chatlu
Let him go	Chatsanu

PERFECT.

I went	Ai chatle
You went	Nang chatle
He went	Mâ chatle

AORIST.

I went	Ai chatlammi
You went	Nang chatlammi
He went	Mâ chatlammi

IMPERFECT.

I was going	Ai chatlure
You were going	Nang chatluyi
He was going	Mâ chatlure

PARTICIPLES.

Going	Chatkidanâ, chattanâ
Having gone	Chatlûdanâ, chatladanâ
When I go (used only in 1st person)	Chatlagâ
For the sake of going (1st person only)	Chatkadabagi
For the sake of going 2nd and 3rd persons only	Chatnanabâ
If I go (used in all three persons, implies a doubt)	Chatlabadi
By having gone,	Chatpaninâ
At the time of going.	Chatlingaidâ

Negative Forms.

PRESENT.

Ai chatloi
Nang chatkanu
Mâ chatloi

FUTURE.

Ai chatlaroi
Nang chatkanu
Mâ chatlaroi

IMPERATIVE.

Chatlanushi
Chatkanu *or* chatluganu
Chattasanu

PERFECT.

Ai chatte
Nang chatkanu
Mâ chatte

AORIST.

Ai chatlamde
Nang chatlamde
Mâ chatlamde.

IMPERFECT.

Ai chatludre
Nang chatludre
Ma chattare

PARTICIPLES.

Chatkîdadanâ, chattadanâ
Chatlûdradanâ
Chattragâ
Chatloidabagi
Chattananabâ
Chatrabadi
Chattabaninâ
Chatringaidâ

Interrogative Forms.

PRESENT.

Are you (or he) going ?	Chatlibra
Are you not going ?	Chatloidra

FUTURE.

Will you go ?	Chatkera, chatkadra
Will you not go ?	Chatloidra

IMPERFECT.

Did you go ?	Chatlûrabra
Did you not go ?	Chatlûdrabra

PERFECT.

Have you gone ?	Chatpra
Have you not gone ?	Chattabra

AORIST.

Did you go ?	Chatlambra
Did you not go ?	Chatlamdra

There is also a past interrogative *chatpage*, which is always used with *kari*, as *kari chatpage* ? = why did you go ? *Chatlibage* is also used meaning 'are you going ?' and *chatlibage*, meaning 'did you go ?'

There appears to be no interrogative for the first person and the forms in *ra* are common to both the 2nd and 3rd persons and the sing. and plural.

*Pronouns.

The personal pronouns are—

Ai or Ihâk = I ; *Nang or nahâk* = Thou ; *Mâ or mahâk* = He

The plural forms are—*aikhoi*, *nâkhoi*, and *mâkhoi*. The forms ending in *hâk* are either emphatic or honorific. All the pronouns are declined in the same way, *e. g.*

<i>Singular</i> Nom.	Nang	Thou
Gen.	Nangi	Of thee, thine
Dat.	Nangandâ	To thee
Acc.	Nangboo	Thee
Abl.	Nangdâgi	From thee
<i>Plural</i> Nom.	Nâkhoi	You
Gen.	Nâkhoigi	Of you
Dat.	Nâkhoidâ	To you
Acc.	Nâkhoiboo	You
Abl.	Nakhoidâgi	From you

The other pronouns are *asi* and *adu*, this, and *masi* and *madu*, that.

There is also an interrogative pronoun *kanâ* or *kanâno* who ?, which is declined in the same way as the personal pronouns.

There are no relatives in the language, and sentences containing a relative are expressed very awkwardly by using a verbal noun with the demonstrative *adu*, thus—Where is the book which I gave you yesterday ? = *Gnarang aina nangandâ pikhiba lairik adu kaidano* ?

Whatever work you do is well done = *Nangna touba thabak adu pumnamak phai.*

Nouns substantive.

These are very simple, and an example of one will serve for the whole language. There is really only one gender in use, but the masculine sex in animals is distinguished by the addition of *laba*, and the feminine by the addition of *amom*; thus *sagol* = a horse, generally *sagol-laba* = a stallion, and *sagol-amom* = a mare; and in men by the addition of *nipa* and *nupi*, thus *macha-nipa* = a son, and *macha-nupi* = a daughter.

The plural is indicated by adding *sing*, but for things without life *pumnamak* is generally used, which simply means "all."

The termination *gi* is used as a genitive in every sense; *da* is used as the dative and also as a locative, both of time and place; thus *yumda* = in the house; *nongmagi numitta* = on a certain day. The termination *boo* is generally an accusative, but occasionally it is used as a dative, though this does not appear to be considered quite correct.

<i>Singular</i> Nom.	Mi	A man
Gen.	Migi	Of a man
Dat.	Midâ	To a man
Acc.	Miboo	A man
Abl.	Midâgi	From a man
<i>Plural</i> Nom.	Mising	Men
Gen.	Misinggi	Of men
Dat.	Misingdâ	To men
Acc.	Misingboo	Men
Abl.	Misingdâgi	From men

Adjectives.

No separate class of words is known in Manipuri as adjectives, but the verbal forms in *ba* are used instead, and they can generally be conjugated indifferently as verbs or adjectives, but sometimes with a slightly different meaning; thus *phaba mi ama* = a good man, *wangba u ama* = a high tree, while, the man is good = *mi asi phai*, the tree is high = *u asi wângi*. When verbals in *ba* are used as adjectives, an initial *a* is often prefixed, thus *aphaba* or *phaba*, *awangba* or *wângbâ*, are used indifferently. In the feminine the final *ba* is changed into *bî*. There is no change in the plural. Some adjectives are merely the negative forms of their opposites thus *phattaba*, bad, is merely the negative of *phaba*, good.

It is extremely probable that there may be some errors in the above, although I have done my best to ensure correctness. I am very doubtful especially about the difference in meaning between the three different forms



of the past tense and the interrogative forms. I fancy the Manipuris themselves often confuse these forms, and it is extremely difficult in a practically unwritten language like Manipuri, to obtain accurate information on minute points of grammar.

The Bárah Bhúyas of Bengal. No. II.—By DR. JAMES WISE.

It was remarked in a former paper* that the European and Muhammadan historians are strangely silent regarding the government of Bengal between 1576 and 1593. That the country was ruled by twelve governors, called Bhúyas, the facts embodied in that paper satisfactorily proved, and on examining the writings of early European travellers and missionaries further particulars regarding these governors are obtained.

Jarric,† who derived his information from the Jesuit fathers, sent to Bengal in 1599 by the Archbishop of Goa, mentions that the "prefects" of the twelve kingdoms, governed by the king of the Pathans, united their forces, drove out the Mughuls, "et suum quisque tyrannice regnum invasit; adeo ut nulli hodie pareant, aut tributum pendant. Non se tamen dixere reges, etsi regium splendorem praeferant, sed *Boiones*, quasi forsan Principes. Hisce tum Patanii, tum Bengalani indigenae parent: quorum tres ethnicae superstitiones servant, Chandecanius, Siripuranus, et Bacalanus; reliqui novem Mahometanes: etsi et rex Arracanus, quem Mogosiorum regem dicunt, partem Bengalae occupet.

D'Avity‡ copies this description of Bengal, but gives a few additional particulars of these twelve sovereigns, as he calls them. The most powerful, he informs us, were those of "Siripur et Chandecan, mais le Masandolin ou Maasudalin," is the chief. This is evidently the primitive way of spelling Masnad-i-'Alí, the title of 'Isá Khán of Khizrpúr.

One of the earliest travellers and writers on Bengal was Sébastien Manrique, a Spanish monk of the order of St. Augustin, who resided in India from 1628 to 1641. On his return he published his Itinerary,§ in which he states that the kingdoms of Bengal are divided into twelve provinces, to wit, "Bengal, Angelim, Ourixa, Jagarnatte, Chandekan, Medinipur, Catrabo, Bacala, Solimanvâs, Bulua, Daca, Ragamol." The king of Bengal, he goes on to say, resided at Gaur. He maintained as vassals twelve chiefs in as many districts (en la doce provincias doce régulos sus

* Journal, Asiatic Society of Bengal, Vol. XLIII, for 1874, Part I, p. 197.

† R. P. Petri Jarrici "Thesaurus rerum Indicarum", Col. Agrippinae, Anno 1615.

‡ La Monde ou la description générale de ses quatre parties, &c., composé par Pierre D'Avity, Seigneur de Montmartin, à Paris, 1643, fol.

§ "Itinerario de las Misiones que hizo el Padre F. Sébastien Manrique," en Roma, 1649.

Vasallos), whom the natives call the twelve "Boiones de Bengala, los quales estan oy todos sugétos al Imperio Mogalano, por guerras civiles que tubieron entre si después de la ruina, y total destruccion del Emperador de Bengala."

It is impossible to accept as correct the above list given by Manrique. We doubt that Orissa, Jagarnáth, and Medinipur, ever had separate rulers; and the name Bengala seems to recall the fabulous city on which so much was written by the travellers of the sixteenth and seventeenth centuries. Catrabo is Katrabo, now a "tappa" on the Lakhya, opposite Khizrpur, and which for long was the property of the descendants of 'Isá Khán. Solimanvás is perhaps Salimbábád in Báqirganj, a pargana which was never included in the territory ruled over by the Chandradíp family.

In the description of the East Indies by Clemente Tosi,* he mentions "Katabro, capo d'una provincia," and goes on to say "e ritornando in dietro per la riva del fiume si vedono un dopo l'altro Siripur, Noricul, e Tamboli, ne cui porti per esser frequentati habitano: et continuando il camino contra la corrente del fiume vegonsi dalla stessa parte Solimanvás e Bacala, citta ambedue metropoli di due Provincie." This passage seems to confirm the supposition that Salimbábád is Solimanvás.

Finally, Purchas describing Sondí† in 1602 gives us some insight into the civil war then waging between different nations at the mouth of the Megna. When Bengal was conquered by the Mughuls, they took possession of the island, but Cadaragi [Kedar Rái of Srípúr] still claimed it as his rightful property. The Portuguese captured it; but this roused the anger of the king of Arrakan, who sent a fleet to drive the Portuguese out, "and Cadaray (Kedár Rái), which they say was true Lord of it, sent one hundred Cossi (kosahs) from Srípúr to help him. The combined fleets were defeated, and the Portuguese entered into a treaty with Kedár Rái. Carnalius, the leader of the Portuguese, took his disabled vessels to Srípúr to refit them. There he was attacked by one hundred kosahs under command of "Mandaray, a man famous in those parts." The Mughul fleet was defeated and its admiral Mandaray killed.

These authorities advance our knowledge considerably. The Bhúyas, according to them, had been dependants of the king of Gaur, but had acquired independence by force of arms. They refused to pay tribute, or to acknowledge allegiance to any one. From being prefects appointed by the king, they had become kings, with armies and fleets at their command,

* Dell' India Orientale descrittione geografica et historica, del P. Abbate D. Clemente Tosi, Roma, 1669.

† Purchas, His Pilgrimage, p. 513.

ever ready to wage war against each other or to oppose the invasion of Portuguese pirates and Mag freebooters.

Note on Mahásthán near Bagurá (Bogra), Eastern Bengal.—By C. J. O'DONNELL, C. S.

Mahásthán Garh is the name of a place famous in the earliest Hindu traditions of this part of India, and also of interest in later times as a Muhammadan shrine of great sanctity. It is situated seven miles north of the Civil Station of Bogra, in $24^{\circ} 57'$ north latitude and $89^{\circ} 25'$ east longitude, and consists of a great mound of earth intermixed with old bricks. This is the Hindu Mahásthán, which, literally translated, means the "great place." Branching out from it north and west are two great ramparts, which are continued round to form a quadrangular enclosure, the later Musalmán Fort or *Garh*. Dr. Buchanan, in his account of the Dínájpúr District, says, "the tradition belonging to this District, which is referred to the earliest period by the Hindus, is that it was under the government of Paras'uráma, a very powerful monarch who had subject to him twenty-two princes, and who lived at Mahásthán Garh in Rájsháhí. The Bráhmaṇs, whom I have consulted, consider this personage as the same with the sixth incarnation of the god Vishṇu, who appeared an immense number of years ago, and on this account I have placed this tradition first; but the common belief of the country is that Paras'uráma of Mahásthán was destroyed by a Muhammadan saint named Sháh Sultán Hazrat Auliya. This does not appear remarkable to the Bráhmaṇs, as they consider that Paras'uráma is still on earth and that he now resides in the western parts of India." They make no remark on the contradiction necessary in referring at once to the earliest Hindu tradition and the Musalmán conquest of Eastern Bengal. The only other source from which I have been able to obtain any information about Mahásthán is a selection of popular legends called 'Laghu Bhárata,' put together by a Deputy Collector of this District in very high-flown Sanskrit, together with some theories of his own. The value of the work may be judged from one of the latter, in which he seeks to prove that, after the Páṇḍava war, Sisunág, of the family of the kings of Magadhá, was an independent sovereign of Mecca in Arabia. With regard to Mahásthán he seems more correct. He identifies it with Bárendra, the capital of the country of the Bárendra Hindus. In favour of this view the only arguments are strong, though simple. The whole country between the Ganges, the Mahánandá, Kámrúp, and the Karatoyá, was undoubtedly the old Barendra Desha. To the present day, much of it is

called 'Barind'. The locality of the greatest fame within it is Mahásthán, and the river of the greatest sanctity, the Karatoyá. At the same time there are evident traces, as I shall afterwards mention, that a considerable city existed near Mahásthán, whilst tradition is even stronger on the point. At that time who were its rulers, it is impossible to say. All round it, however, there are shrines, holy wells and embankments connected with the name of Bhíma, one of the Páṇḍava brothers. The legend runs that at the end of their great contest with the Kauravas, they went into the forests of Kámrúp to perform the penitential ceremony, called *banabás*, for a year, at the end of which time Bhíma settled in the country of the King Viráṭa, who ruled in Matsya Desha, or the Land of the Fish, which included much of the present Bogra District, and was so called from the fact that Viráṭa was said to be the offspring of his mother's amour with a fish. Bhíma is said to have made a large fortified town south of Mahásthán, which is marked by great earthworks altogether about eight miles long, and still in places as much as twenty feet high. The whole country between them and Mahásthán is in places covered with old bricks. Inside the earthworks the bricks are fewer, but outside and east from Mahásthán they are very numerous. I am led to think that the enclosure was, like the ring forts of Italy, a place of temporary refuge not only for the people of the neighbouring town, but of the country round in times of danger. On one side it was protected by the great river Karatoyá, and on the other by a deep and wide ditch for some four miles long, which still exists and is used for boat-traffic in the rains. These earthworks are called by the people *Bhímá-jangal*. After Bhíma a dynasty of Asuras is said to have reigned in the surrounding country, and to have made the shrine at Mahásthán one of its most holy places. In Bráhmāṇi literature the word 'Asura' is used very much as we use pagan, and was certainly applied to the Buddhists. Dr. Buchanan explains it as meaning 'a worshipper of Ś'iva' as opposed to a worshipper of Kṛishṇa. The other explanation is now preferred, particularly as it is known that the earlier Pála Rájás, many of the remains of whose times are found in this district, were Buddhists. The history of this dynasty belongs properly to Dínájpúr, but it may be mentioned in connection with Mahásthán that there is a legend that on a certain occasion twelve persons of very high distinction and mostly named Pála, came from the west, to perform a religious ceremony in the Karatoyá river, but arriving too late, settled down on its banks till the next occurrence of the holy season, the Náráyaṇí, which depends on certain conjunctions of the planets, and was then twelve years distant. They are said to have built numerous palaces and temples, dug tanks, and performed other pious acts. They are said to have been of the Bhuinhár or Bháman *zamíndár* tribe, which is, at the present day, represented by the Rájás of Banáras and Bhattia.

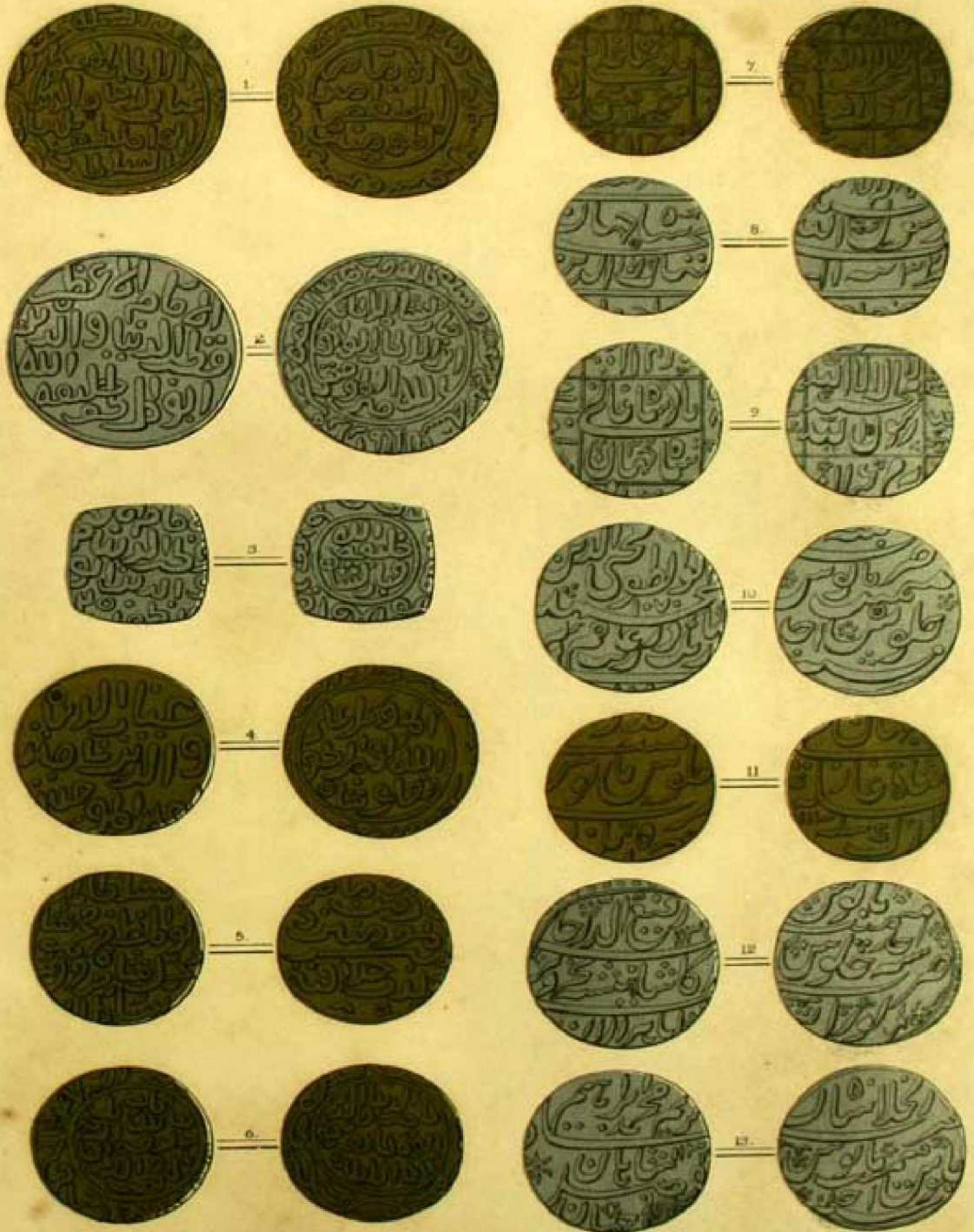
On the top of the Mahásthán mound there lies a figure made seemingly of limestone, which I was informed by one of the *fakírs* of the Muhammadan shrine had been found in a neighbouring marsh. It is the figure of a woman, very like what is usually said to be of Buddhist production, but is perfectly nude, and it is hard to find any distinguishing sign. The back is quite undressed and the lower legs which have no feet are square, as if they were intended to fit into holes in some larger piece of stone, probably some part of the front of a temple.

After this time, Mahásthán became a seat of orthodox Hinduism, and the worship of S'iva was celebrated with much fervour. Within a radius of a mile, a hundred thousand *lingas* are said to have been set up in honour of that god. About the end of the thirteenth century, according to the most generally accepted traditions, Mahásthán was the capital of a minor Kshatriya prince, named Paras'uráma. At that time the Muhammadans had conquered Gaur, and driven the last Hindu dynasty out of Nadiyá, and their arms were beginning to be pushed to Eastern Bengal. It was then that a humble *fakír* or religious mendicant appeared before Paras'uráma, and begged for as much ground as he might cover with his *chamrá*, or skin, kneeling on which he might say his prayers. The Hindu prince granted his request, and the *fakír*, turning towards the west, began to pray. Scarcely had he done so when the skin began to expand, and before he had done, it covered nearly the whole principality. Paras'uráma called his troops together and attacked the *fakír*, but to no purpose, as he and they perished in the battle. Paras'uráma had one daughter, the beautiful S'ilá Deví, whom the conqueror, who bore the name of Sháh Sultán Hazrat Auliyá, now claimed as his prize. The Hindu princess pretending to accept her fate, found an opportunity of stabbing him, and then threw herself into the Karatoyá. A steep part of the bank, where there is now a flight of stairs, still bears the name of S'ilá Deví's Ghát, and in Hindu hymns the favourite name for Mahásthán is 'S'ilá Dvípa', or the Island of S'ilá. The word 'island' draws attention to a change which has taken place in the river Karatoyá. It at one time divided into two branches near Mahásthán, re-uniting again about a mile north of the present town of Bagurá. The western branch is now the little stream Subil.

There is a title very frequently appended to Sháh Sultán's name, *viz.* : 'máhi-suwár', or 'riding on a fish', which is variously explained. The most generally given, though not very satisfactory, reason is, that he came in a boat shaped like a fish, or with the figure-head of a fish. A very strange figure is still found on the top of the Mahásthán mound, which may be connected with this name. There is the figure of a girl with a long fish's tail, altogether presenting the recognized semblance of the mermaid of English story. The tail is curved up under the right arm, and is covered with

scales. On her head there are also, what seem to be, large scales instead of hair. She is half reclining on her left side, but on what no one can say, as it is much defaced and partly broken or perhaps only chipped. On her right shoulder is a large right hand clenched, placed back downwards with the fingers turned up. At first, this seems part of a larger figure from which it was broken, but I found on a piece of limestone which seemed to have been at one time the threshold of a temple, a relief, much worn, which was precisely the same as the larger one. The relief was three to four inches long and the other about two feet square. I cannot pretend to explain these forms, but it is quite possible that they are connected with the old Hindu times, and may be some reference in stone to the allegory to the name of the land of the fish applied to this country.

All the Muhammadan buildings, some of which by appearance and repute are modern, are entirely made of brick, except where stones, evidently taken from some older building, are used. I noticed a few small blocks of granite lying about. At present, the shrine is approached from the Rangpúr road on the west by a steep flight of stairs. These are evidently of comparatively modern erection, the former approach being from the north by a winding path, like those seen on Buddhist topes, which, after passing nearly once round the mound leads to a spot midway between the tomb of Sháh Sultán and a small mosque built some two hundred years ago, and where a large *linga*, some three feet and a half wide, still lies half buried in the ground. The door entering into the tomb is supported on two uprights of stone, on each of which a word or two in Devanagari is still to be seen, though they are in parts so worn as to be unintelligible. I was told by one of the *fakirs* who live on the mound that about twenty years ago an English gentleman carried away to Rangpúr a large square block of stone, on all four sides of which there were inscriptions—he could not say in what character—and figures like the woman-fish above mentioned. This shrine is supported by the largest *pírpal* holding in the district, measuring as it does some 650 acres. It was granted by a sanad given by an Emperor of Dili. This has been lost, but it is known that the grant was recognized and confirmed in the year 1076, Hijrah, A. D. 1666, by a *farmán* of the governor of Dháká. In 1836, proceedings were instituted by Government for resumption of this tenure, but they were abandoned in 1844 on proof of the great age of the grant. There are besides other sources of revenue. A fair is held at Mahásthán about the middle of April, the profits of which (about £60) are made over to the shrine. The *mutawallis* of the *dargáh* are of the family of the Chaudhari zamindárs of Bihar and Paikar.



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Part I.—HISTORY, LITERATURE, &c.

No. III.—1873.

On Traces of Buddhism in Dinájpur and Bagurá (Bogra).—By E. VESEY WESTMACOTT, B. C. S., F. R. G. S., Member of the Bengal Asiatic and Royal Asiatic Societies.

(With a plate.)

I cannot tell what may have been the original position of this little pillar, which was brought to me from the neighbourhood of Potnítalá in Dinájpur. The other three sides are similarly carved to the one which I have drawn, but contain no inscription. From its size I should think that it was a votive offering, set up in a temple or in the court yard of a temple. The Buddhism of the giver is plain, not only from the carving, which represents Buddha teaching the law, with hand uplifted, but from the lower of the two inscriptions, which is the well known Buddhist formula, '*ye dharmma hetu prabhava hetu, etc., etc.*' "Of all things proceeding from cause hath Tathágata explained the causes. The great Sramana hath likewise explained the causes of the cessation of existence." The upper inscription I am not Sanskrit scholar enough to read. It seems to give the name of the person who presented 'this stone made pillar', but to contain no date. The character is in that stage of progress towards modern Bengali, which we find in use in the eleventh century of the Christian era. It is more modern than that of the Ámgáchhi copperplate, engraved in the reign of Vighraha Pál, and I should fix its date at the period of one of the last of the Pál kings, a dynasty whose Buddhism is well known. The pillar was probably intended to represent a Buddhist *stupa*, and before it was broken, probably bore three umbrellas, one above another.

In all south-eastern Dinájpur, and the neighbouring parts of Bogra, remains of Buddhism and of the Buddhist Pál kings are numerous. It was in this neighbourhood that in the seventh century the Chinese pilgrim Hiouen-Thsang found the Buddhist court of Paundra-Varddhana, which I identify with Varddhana-kúti, the residence of a very ancient family, close to Govindganj, on the Karatoya. Mr. Fergusson, in his paper on Hiouen-Thsang, quotes from an account of Pundra Desa in the fourth volume of the *Oriental Quarterly Magazine*, that Verddhana Kuta, governed by a Yavana, or Musalmán, was one of the chief towns of Nivritti, comprising Dinájpur, Rangpur, and Koch Bihár, and consequently the eastern half of Hiouen-Thsang's kingdom of Paundra-Varddhana. If the Pál kings were not the rulers of Bengal in the time of Hiouen-Thsang, little more than a century elapsed from his visit before they became so. They resided in the part of the country of which I am speaking, and may have continued to do so for some time after the Sen dynasty had established itself at Bikrampur, near Dháká. Dharmma Pál, whose fort still bears his name, more than seventy miles north of Varddhana-Kúti, and other Pál kings, were ruling east of the Karatoya long after Bengal had been subdued by the Sens, before whom indeed the Páls probably retreated by degrees to the north-east, and were supplanted without any great catastrophe. Had the Sens signally defeated the Páls, and violently dispossessed them, I cannot but think that there would have been some trace of such an event in history.

Be that as it may, the Pál kings and their Buddhism have left their traces plentifully in this corner of Bengal. First, thirty-two miles W. S. W. from Govindganj, in a village called Pahárpur, or 'the Town of the Hill', is a tall brick mound which was once a Buddhist *stupa*, and, so far as I know, the only one of importance in this part of the country. Dr. Buchanan has described it in his account of Dinájpur. It is, he says—"An immense steep heap of bricks, from a hundred to a hundred and fifty feet in perpendicular height, covered with bushes, and crowned by a remarkably fine tree." Half way up, Dr. Buchanan saw three large rough stones, but without an inscription; for these I searched in vain. "On the summit is a small chamber of brick, with a door facing the east and a small niche towards the west. This is said to have been the residence of a Muhammadan hermit, which is very probable. The heap of bricks, or hill, as it is called, has been surrounded by a square rampart, the ruins of which contain many bricks, and each side may be 400 yards in length. The rampart is overgrown with trees, but the space between it and the hill is clear, contains some small tanks, and indications of brick buildings, especially towards the corners of the rampart. The thickness of this would induce one to believe that the place might have been a fortress; but no ditch can be traced, and the heap, which is by far the most re-

“ markable part of the ruin, could not have answered for defence. I am
“ therefore inclined to believe that it has been a temple, and its great steep-
“ ness and height induce me to suppose that it has been solid, like many of
“ the temples of Buddha in Ava and Nepál ; for a hollow temple, of which
“ the roof had fallen in, would be much flatter. My conjecture is confirmed
“ by the vicinity of the several places which are said to have belonged
“ to the Pál family, who were worshippers of Buddha.”

I have no doubt but that Dr. Buchanan is correct, and the rampart round, I think, was probably raised, as usual in this low lying country, as a foundation for buildings, which buildings would be the monastery, surrounding the *stupa*.

Only five miles W. N. W., at the curious subterranean place of worship, called Jogíghopá, I saw stone carvings of undoubted Buddhist origin. On one slab, twenty-one inches long, was carved Máyá-Deví, recumbent, with the baby by her side and attendants round her. With it was a slab, 40 inches high, with a relief of Náráyana Chaturbhuja, bearing the *shank, yada*, lotus, and disc, showing that the Buddhist carving had been preserved by the votaries of a later religion. The carvings were singularly perfect. In a field near the tháná of Khyetlal, said to have been a residence of the Bordhonkúti zamíndárs, who once owned all Khyetlal, I saw carvings corresponding curiously with those at Jogíghopá. The carvings at Khyetlal are four. They are set up in a field as objects of worship. One, if not two, are Buddhist, the others are S’aiva sculptures of a later date.

First, on a slab 32 inches by 14, Máyá Deví in high relief ; the head rests on the left hand, the right knee is bent ; the baby, the infant Buddha, is on a pillow below, a small figure is at each end of the bed, and on a scroll above are ten little seated figures. This is probably as early as the ninth or tenth century.

Second, on a slab 12 inches by 9½, a relief of a figure seated on a lotus. He has two arms only. The head has disappeared. Below are two figures, one blowing some instrument, the other holding something like a scarf. I think this may be a Buddha.

Third, on a slab 23 inches by 14, is a relief of a pair dallying. The male is four-armed, and under him is a bull, under the female a lion. I conclude that they represent S’iva and Párvatí.

Fourth, on a slab 38 inches by 20, a sculptured figure, partly in relief, partly in the round, of a deity erect on a lotus. It is much mutilated, and I am not sure whether there were originally four arms or six. Below are two pairs of small female figures, and above one flying, the corresponding corner being broken off. On each side of the principal figure, facing outwards, is the well known device of the Lion, rampant on a small crouching Elephant, of which I have long tried to discover the historical significance.

It evidently belongs to a later period than that of the Buddhist kings. This last sculpture is almost exactly similar to the one at Jogíghopá, called Náráyana Chaturbhuja, which has also the device of the lion and elephant.

It is quite clear that the S'aiva worshippers preserved the Buddhist sculptures of an earlier age with their own. Whence these remains were taken it is impossible to conjecture. The only traces of antiquity near Khyetlal are certain inequalities, said to have formed the site of a residence of the Borddhon-kúti zamindárs, but they contain scarcely any bricks, and appear to be comparatively modern. Near the sculptures are the S'aiva *lingam* and *argha*, and close by was found a granite pillar, which I caused to be set up at the corner of the tháná compound.

North-east from Panchbíbi tháná, and eleven miles N. N. E. from the Pahárpur *stupa*, on the banks of the Tulsiganga, is the shrine of Nimay Sháh, a Muhammadan saint of great sanctity. The place is called Pathargháta from the number of stones collected in the river. I made my way to this place with great difficulty, and my visit was very disappointing from the density of the jungle and an attack of fever. As I left the shrine, I came face to face with a large leopard, whom I woke up from his siesta under a tree. I saw quite enough to satisfy me that this formed no exception to General Cunningham's rule that the erection of a Muhammadan mosque always implies the destruction of a Hindu temple. There is a decided mound of bricks, which has evidently been much reduced by taking material for the Muhammadan buildings, which have been rather extensive, but if, as I think likely, the mound has been a Buddhist *stupa*, it must have been a much smaller one than the one at Pahárpur, unless indeed, the main part of the original *stupa* has been cut away by the Tulsiganga, which might account for the great number of stones in the bed of the river. Among them I found the head and shoulders of a colossal statue of Buddha.

About a mile to the north-west, at a place called Mahípur, the heavy jungle covers the remains of many masonry buildings, which Dr. Buchanan was told had been the residence of Mahí Pál, while similar ruins at 'Aṭápur, close by, were said to have been the palace of Usha Pál. I could hear of no traditions of the Páls when I was in the neighbourhood. On the actual spot there are no inhabitants. Nevertheless, the name of Mahí Pál is certainly suggested by the name Mahípur, as it is by numerous other names, from the tank of Mahí Pál Dighí, forty-five miles to the northwest, to Mahíganj in Rangpur, fifty miles N. N. E. from the great *stupa*. It may be traced in several places called Mahíganj, Mahípur, or Mahínagar, and perhaps in the name of Mahí Santosh, given to the site of a Muhammadan shrine on the banks of the Atrai, in parganah Santosh, evidently occupying the site of a large Hindu town. The inscriptions on the tomb are of the date of Bárbak Sháh.

I have mentioned the frequent existence of brick remains in the jungle in this neighbourhood. I cannot nearly enumerate all, but I may instance the traces of a large town nine miles south of the Pahárpur *stupa*, through which the Northern Bengal Railway, now in course of construction, will run for some distance. The only clue to its origin with which I am acquainted, is the dimension of the bricks, ten inches square by two and a half thick. I believe these large bricks are assigned to the Buddhist period. The only piece of sculpture I saw was a brick carved in relief, in a style which I consider not earlier than the last half of the seventeenth century, but the town is certainly much older than that.

There are remains at Nayánagar on the Karatoya, twenty miles north of the *stupa*, called a Rájbárá. I have not seen them, but at Bagjoná I saw a handsomely carved stone lintel, six feet by ten and a half inches, and seven inches thick, said to have been brought from Nayánagar. It bore no figures or inscriptions.

Close to Jogíghopá are extensive brick remains, said to have been the palace of Dev Pál; whether the Dev Pál of the Munger plate or not I will not say, but certainly he of the Ámgáchhí plate. Bhimla Deví, daughter of Dev Pál, is said by the ignorant *pújáris* to be represented by one of the Jogíghopá carvings. A mile to the south-west, at Amári, are more brick remains, which Dr. Buchanan heard called the palace of Mahí Pál. Across the *bil*, two miles north-east, at Chondíra, are remains, which he was told were those of Chandra Pál's palace; there are more bricks at Katak and Dhorol, and indeed in all the country round are innumerable brick ruins. Seven miles north of the great *stupa* is the celebrated Buddal pillar, set up by a minister of Náráyaṇ Pál, and bearing an inscription, in which Dev Pál and Sura Pál are mentioned as having preceded Náráyaṇ Pál. A dozen miles north of that again was found the Ámgáchhí plate, containing a grant by Vigraba Pál, and enumerating his ancestors, Naya Pál his father, Mahí Pál, Dharmma Pál, and others.

I think it likely that much might be added to our knowledge of the Buddhist kings of Bengal, by properly organised research in this neighbourhood. The Pahárpur *stupa* might be excavated, and perhaps that at the shrine of Nimay Sháh, unless it appeared on examination that the river had really cut away the central portion of it. I should like also to endeavour to trace the old towns, especially those occupied by Muhammadan shrines, as at Mahí Santosh; for I consider the selection of a site for a mosque by the early Muhammadans to be an indication that on the spot they found plenty of material in Hindu buildings, or in other words that the site had been occupied by extensive masonry buildings before the Muhammadan conquest.

The sanctity of Jogíghopá, and the Buddhist carvings preserved

there, indicate the remains of the palace of Dev Pál as another place likely to reward research. Besides the possibility of finding inscriptions, it would be interesting to discover the plan of those great buildings of which the granite cornices, mouldings, and pillars, and the delicately carved doorways, have been spread far and wide through the neighbouring districts, wherever materials were required for new erections. Whether we should succeed in finding any such traces of Buddhist buildings is a question I could not answer positively in the affirmative; for it appears that S'aivas have built with materials taken from Buddhist ruins, Muhammadans have similarly plundered the S'aivas, and have in their turn furnished materials for modern Hindu architecture, but I think the experiment would be well worth trying, and should be glad if I had funds and leisure to devote to it.

The Rhapsodies of Gambhír Rái, the bard of Núrpur, A. D. 1650.—

By JOHN BEAMES, C. S.

A short notice of this work has already appeared in the Society's Proceedings for August 1872, but as it possesses considerable interest both from a philological and historical point of view, it has been thought advisable to reproduce it entire as regards the text, with tentative translations of such parts as are translatable. Those parts the meaning of which is not clear to me, have been left untranslated, and I hope that scholars in other parts of India will kindly offer suggestions as to these (to me) obscure portions. The whole work may perhaps ultimately be published in the Bibliotheca Indica, but the pages of the Journal seem to be the fitting place for its preliminary discussion.

The work is contained in a little volume of 105 small quarto pages, written in rather an indistinct hand, and very carelessly copied. One line is run into another, and whole words and passages omitted or hopelessly garbled; but there are so many repetitions, that we are fortunately able to restore some of the garbled passages by comparison with other places where the same phrases recur. Some of the characters, especially compound ones, are so badly formed, that I can only guess at their meaning.

The poems are not a continuous history, but short songs or rhapsodies in praise of Rájá Jagat Singh, such as are sung by bards at the feasts and festivals of native princes, and the historical events are hinted at rather than detailed; they were evidently well known to the bard's hearers and therefore needed no further description.

Mr. Blochmann has kindly furnished me with a note on the Rájás of Núrpur and a translation of the Muhammadan historian's account of Rájá Jagat Singh's rebellion from the Pádisháhnámah. These will form a fitting

introduction to the poem itself, and the allusions therein will be easily understood by reference to the historical narrative.

The Rájá's of Núrpúr.

Núrpúr lies N. W. of Kángrah, on the Jabbarkhad, a small tributary of the Chakkí river, which flows into the Biáh. Its old name Dhamerí (دهمیری), the "Tammery" of De Laët and other old travellers, was changed to Núrpúr by Rájá Bású in honor of *Núruddín* Muhammad Jahángír. Muhammadan Historians generally call the Rájás of Núrpúr "zamindárs of Mau and Paṭhán". Mau was one of their strongholds, and was destroyed by Sháhjahán; and Paṭhán, or Paithán, is the same as Paṭhánkot, west of Núrpúr. Paṭhán is mentioned in the *Áin* as a parganah of the Bári Dúáb, containing 199,872 bíg'hahs, yielding a revenue of 7,297,015 dāms (40 dāms = 1 Akbarsháhi Rupee), and furnishing 250 horse and 2000 foot; and Dhamerí is quoted as yielding 1,600,000 dāms, and furnishing 60 horse, and 1300 foot.

The zamindárs of Mau and Paṭhán are first noticed in the very beginning of Akbar's reign, when Rájá Bakht Mall is mentioned as a supporter of Sikandar Súr, whom Akbar, in 965 A. H., besieged in Mánkot. When Bakht Mall saw that Sikandar's cause was hopeless, he paid his respects in the Imperial camp, and accompanied, after the surrender of Mánkot, the army to Láhor, where Bairám Khán had him executed on the ground that he had supported Sikandar Súr. As successor Bairám appointed his brother Takht Mall. I am not sure whether the names of these two Rájás are correct, or whether the first should be called Takht Mall and the second Bakht Mall; for in every MS. of the Akbarnámah that I have seen, the two names (which differ only in the diacritical points) are continually interchanged.

Nearly thirty years later, we hear of Rájá Bású as reigning Zamindár of Mau and Paṭhán. It is not stated how he was related to Bakht Mall and Takht Mall; but the historians of the reigns of Sháhjahán and Aurangzib look upon him as the founder of a new line, and give the following genealogical tree—

Rájá Bású of Núrpúr (dies 1022).

(1.) Súraġ Mall. (2.) Mádhú Singh. (3.) Jagat Singh (dies 1055).

1. Rájráp (dies 1077).

2. Bháo Singh (Muríd Khán).

The last, Bháo Singh, in the beginning of Aurangzib's reign, turned Muhammadan, and received the name of Muríd Khán. His descendants, according to the *Madásir ul-Umará* still hold Sháhpúr, N. W. of Núrpúr,

near the Rávi, and "he who becomes Rájá, takes the name of Muríd Khán."

Rájá Jagat Singh served under Jahángír in Bengal, and in the 13th year when Súraj Mall rebelled, the emperor called him from Bengal, made him a commander of 1000, with 500 horse, gave him the title of Rájá, and a present of 20,000 Rupees, and sent him to Rájá Bikramájít, who invested Kángrah. Up to the end of Jahángír's reign, he rose to a command of 3000, with 2000 horse.

Under Sháhjahán, Jagat Singh retained his mançab, and was in the 8th year appointed to Bangash, and two years later to Kábul, where he distinguished himself in the capture of Karímdád, the son of Jalálah Taríkí, the Afghán rebel. In the 11th year of Sháhjahán's reign, when 'Alí Mar-dán handed Qandahár to Sháhjahán, and Sa'id Khán (سعید خان) was sent from Kábul to drive away the Persians, Jagat Singh commanded the *haráwal*, or vanguard. Arrived at Qandahár, Jagat Singh was ordered to conquer Zámín-Dáwar; he accompanied afterwards the army to Bust, where he distinguished himself. In the 12th year, he paid his respects at Láhor, received several presents, and was appointed Faujdár of Upper and Lower Bangash. Whilst he was there, his son Rájrúp rebelled, as will be seen from the following free translation from the *Pádisháhnámah*.

The Conquest of Mau and Nu'rupu'r under Sha'hjaha'n.

(*Pádisháhnámah*, Ed. Bibl. Indica, II, pp. 237ff.)

In the 12th year of Sháhjahán's reign, when Sháhjahán was at Láhor, he appointed Rájrúp, eldest son of Rájá Jagat Singh of Mau, Faujdár of the Dáman i Koh i Kángrah and collector of the *peshkash* due by the several petty hill states. In the following year, when the emperor was in Kashmír, Rájrúp, who acted in concert with his father in Bangash, rebelled, and Jagat Singh, through friends he had at court, expressed a feigned dissatisfaction at the misconduct of his son, and requested the emperor to relieve him of his duties in Bangash and bestow upon him the office of his son. This would give him an opportunity of punishing Rájrúp, and of collecting the *peshkash*, which he valued at four lacs of rupees. The emperor gladly accepted the offer; but no sooner had Jagat Singh arrived in his district than he made preparations for rebellion, trusting to the height of his hill forts and the impenetrability of the jungles. He fortified especially Tárágarh, with the view of making it an asylum in days of ill-luck.

When the news of his rebellious conduct reached the court, Sháhjahán could scarcely believe it, and sent Kabrái Sundar to Mau to report on the truth of the rumour. Sundar had an interview with Jagat Singh, and, on his return to court, reported that the Rájá was sorry for his misbehaviour; he wished, however, to remain for a year in his district, and would send his

son Rājrup to court to ask for pardon. The emperor hesitated no longer, and appointed three corps to commence operations against Jagat Singh. The first corps was placed under Sayyid Khān Jahān Bārha,* who was supported by Nazar Bahādur Khweshagī;† Shamsuddin, son of Zulfaqār Khān; Rājā Amr Singh of Narwar; Sayyid Lutf 'Alī; Jalāluddin Mahmūd; Rāo Dān Singh Bhadauria; Mir Buzurg; Sarmast, son of I'timād Rāi; and several other mançabdārs, Ahadis, both bowmen and matchlockmen, and zamīndār troops. The second corps was commanded by Sa'id Khān Bahādur Zafarjang, together with his sons and relations, Rājā Rāi Singh, Itifāt Khān Çafawī, Gokul Dās Sīsauidia, Rāi Singh Jhālā, Kripārām, Nādi 'Alī, Chait Singh, with other mançabdārs and Ahadis, both bowmen and matchlockmen, and Mushkī Beg, Bakhshī of Dārā Shikoh, with 1000 horse of the Prince's contingent. The third corps was under Açalat Khān, his brother 'Abdulkāfi, Muhammad Amin and Muhammad Mūmin, sons of Shāh Quli Khān, and other imperial mançabdārs, and Khusrau Beg, an officer in the employ of Yamīn ud-daulah [Açaf Khān Khānkhānān, brother of Nūr Jahān, and father of Mumtāz Mahall] with 1000 horse of his contingent, and 500 horse belonging to Islām Khān under their Bakhshī. The whole was placed under the command of Prince Murād Bakhsh, who with Rājā Jaisingh, Rāo Amr Singh, Jān-sipār Khān, Akbar Quli Khān Sultān Gakk'har, Hari Singh Rāthor, Chandr Man Bundelah, Daulat Khān Qiyāmkhānī, Rāi Kāsīdās, Khizr Sultān Gakk'har, and Khalīl Beg with 700 Ahadis, Nāhir Solangī, Bābā i Khweshagī, and other mançabdārs, was to move from Kābul over Siyālkoṭ to Paṭhān.

On the 17th Jumāda I., 1051 [14th August, 1641], the first two corps under Sayyid Khān Jahān and Sa'id Khān assembled at Rāipūr and Bah-rāmpūr, waiting for the arrival of the Prince; and Açalat Khān pushed on to Jammū, to collect the zamīndārī troops of the District. When the Prince arrived, the whole army marched to Paṭhān. Khān Jahān and Sa'id Khān had each received valuable presents from his Majesty before leaving; so had Açalat Khān, Rāi Singh, Itifāt Khān, Nazar Bahādur Khweshagī, Zulfaqār Khān, Shamsuddin, son of Nazar Bahādur, Rājā Amr Singh of Narwar, Gokul Dās Sīsauidia, Rāi Singh Jhālā, and others. One lac of rupees was given to Khān Jahān as an advance. As reporter to Khān Jahān's detachment Sultān Nazar was appointed, and Qāzī Nizāmā to that of Bahādur Khān.

Murād Bakhsh now appointed Sa'id Khān, Rājā Jai Singh, and Açalat Khān, to invest Fort Mau, which lies 3 kos from Paṭhān, and remained himself in that town to collect supplies.

Khān Jahān, on the 2nd Jumāda II. [29th August, 1641], left Rāipūr,

* Ain translation, pp. 392, 394.

† Of Kasūr, Lāhor District.

in order to march by the Balhawán Pass (بلهوان) on Núrpúr. At the foot of the pass, he came upon Rájrúp. Khán Jahán appointed Najábat Khán *haráwal*, who engaged Rájrúp. The obstacles which had been set up at the foot of the pass, were forced, and Khán Jahán moved rapidly to Machhí Bhawan. The enemy had everywhere blockaded the roads; but a native of the district shewed the Imperialists a path, which from its inaccessibility had not been obstructed. By this way the army arrived on the 14th Rájab [9th October, 1641] at the summit of a hill, half a *kos* from Núrpúr. The houses outside the Fort were given up to pillage, and the army encamped at the foot of the Fort. The Fort, which was well provided with provisions and material, was garrisoned by about 2000 mountaineers, mostly armed with matchlocks. Khán Jahán opened trenches and commenced the siege.

Sa'id Khán had in the mean time marched by way of Mount Hárah (گله), and Rájá Jai Singh and Açalat Khán along the valley of the Chakkí River, and both met at Mau. The army encamped near Rájá Bású's villa, which lies on even ground, but it is joined by means of a hill with Mau itself. The roads were everywhere blockaded, and stone barricades with towers had been erected. The army could only slowly advance, and the soldiers had everywhere to cut trenches for protection against the fire of the enemies.

On the 17th Rájab [12th October], Qulij Khán and Rustam Khán joined the Prince at Paṭhán, bringing orders from Court that Qulij Khán should march to Mau, and Rustam Khán to Khán Jahán at Núrpúr. Reports had, in the mean time, been received at Court from loyal zamíndárs of the district to say that the occupation of Rupar (رپر), which overlooks Mau, was necessary for the complete investment of Mau; and as Prince Murád Bakhsh reported the same, orders were sent to Sa'id Khán to move to Rupar. A portion of the troops at Núrpúr under Najábat Khán as *haráwal*, Nazar Bahádur Khweshagí, Akbar Qulí Sultán Gakk'har, and Rájá Mán of Gwáliár, should join Sa'id's corps. On the receipt of these orders, Sa'id Khán, on Tuesday, 15th Sha'bán [9th November, 1641], broke up, marched along the Núrpúr Pass, and halted in the neighbourhood of the Mau Mountain on the road to Rupar. He then sent his sons Sa'dullah and 'Abdullah with a detachment of men of his own contingent, and Imperial Rifles under Zulfaqár, from the right and the left, up the mountain to fix upon a site for the camp. On reaching the height, they sent a report to Sa'id that much jungle would have to be cut, if the whole army was to come up. They waited for further orders, when they were suddenly attacked by 4 or 5000 matchlockmen and bowmen from a neighbouring hill. Sa'id sent at once reinforcements under his son Luṭfullah, and afterwards more under Shaikh Faríd and Sarandáz Khán. Before Luṭfullah could join his brothers, he was attacked, and received a sword-wound in the right shoulder and a spear-wound in his left

arm. He was with difficulty taken from the field by Khwājah 'Abdurrahmán, son of 'Abdul 'Azíz Naqshbandí, as the enemies were just disabling the horse. Zulfaqár drove away the enemies who had attacked him, and retreated to Sa'id Khán, and soon after, Sa'dullah and 'Abdullah arrived likewise. Sa'id Khán reached Rupar next day, cut down the jungle for the encampment, cut ditches, and set up hedges, to guard against night-attacks. The enemies now collected in large numbers round about, and continued to erect fences and throw up obstacles of all sorts. Sa'id advanced slowly cutting down the jungle; and on the 21st Sha'bán [15th November], the vanguard under Najábat Khán arrived at a pass in the neighbourhood of a hostile camp near Rájá Bāsú's garden. The enemies were at once attacked, from one side by Zulfaqár with the Imperial artillery, and from the other by Nazar Bahádur Khweshagí, Shaikh Faríd, Akbar Quli Sultán Gakk'har, Sarandáz Khán, and Rájá Mán. A number of men of Najábat Khán and Rájá Mán put boards on their heads instead of shields, rushed forward, and set fire to a wall made of poles and planks. Several were killed on both sides.

In the night before the 29th Sha'bán [22nd to 23rd November], Rájá Mán sent about one hundred foot of his own native place to surprise Fort Chhat (چھٹ). They killed many enemies, who had left the Fort to oppose them, among them the commander. A portion of them occupied the Fort, the rest returned to Rájá Mán.

During the day, a bastion (*burj*) of Fort Núrpúr, which Khán Jahán besieged, was blown up. This happened as follows. Zulfi Khúnzan and Aqá Hasan Rúmí had laid seven mines in various directions. Six of them had been discovered by the besieged, who filled them with water. The seventh had been made from the trenches of Khán Jahán's men, and had been successfully carried forward to the bastion, a space of three yards only remaining undug to the very foundation of the bastion. Khán Jahán's son and his men, from fear that the besieged would detect the last mine too, filled it with powder, and sent word to Khán Jahán that the mine was ready. Khán Jahán, therefore, gave in the afternoon orders to the men of several trenches to be ready for an assault, and to fire the mine. But as the mine was incomplete, one side only of the bastion flew up, whilst the other side sank to the ground. But the besieged had been cunning enough to erect behind each bastion a wall, which was joined with both ends to the outer wall of the Fort. This wall behind the blown up bastion remained uninjured, and no actual breach was effected; and Sayyid Luṭf 'Alí and Jaláluddín Mahmúd, who had rushed forward with Khán Jahán's men, found the way closed, and called to the *bildárs* to throw down the wall. The besieged thinking that the Imperialists had succeeded in effecting a breach, retreated to the inner Fort, keeping up a destructive fire on Luṭf 'Alí, who was shot in the

hand. But unfortunately it got dark, and the storming party had to retire.

In the end of Sha'bán, Bahádur Khán was ordered by his Majesty to move from Islámpúr to Paṭhán, where he met the Prince with 3000 horse and the same number of foot. On the last of Sha'bán [23rd November], Damṭál [south of Paṭhánkot] was taken by Bahádur Khán, and Tihárá by Allah Virdi Khán. The emperor also sent orders that Aḡálat Khán should hasten to Núrpur and take part in the siege; and Sayyid Khán Jahán, Rustam Khán, and others, together with Bahádur Khán as haráwal, should attack Mau by way of Ganga-thal (گنگی تھل); for when Mau was conquered, it would be easier to reduce Núrpur. The Prince should leave Ráo Amr Singh and Mírzá Hasan Ḡafawí in Paṭhán, and march upon Mau, and encamp in the pass, where, in former days, 'Abdullah Khán Bahádur had encamped.

On the 1st Ramazán [24th November], the Prince left Paṭhán for Mau. Jagat Singh began now to doubt of success, and requested Allah Virdi Khán to beg the Prince to allow Rájrúp an interview: the Imperial commanders, from envy and hatred towards him, had forced the war on him, and their only object was to rob and kill him and his people. As Rájpút, he had to defend his military honor; but as the Prince had now himself come, he wished to submit and send his son to settle affairs.

On the 5th Ramazán [28th November, 1641], Rájrúp with a halter round his neck appeared before the Prince, who promised to intercede on Jagat Singh's behalf with his Majesty. But the emperor, to whom the Prince sent a report, demanded an unconditional surrender, and Murád Bakhsh had to send Rájrúp back.

Sayyid Khán Jahán and Bahádur Khán were now sent by the Prince over Gangat'hal to Mau. They moved slowly forward cutting down the jungle, and drove away the enemies wherever they found them. When they approached strong barricades, they dug trenches, and thus succeeded in overcoming all obstacles. When they reached Mau, Jagat Singh, with the best men of his own clan, engaged them in sharp encounters for five days. Neither Bahádur Khán, nor Khán Jahán, spared their men; in fact, the men of Bahádur Khán used the dead bodies of the slain to step over the trenches dug by the enemies. But during these five days, no less than 700 men of Bahádur Khán's contingent were killed and wounded, and the same number of the other corps. A large number of the enemies also 'went to hell.' All officers fought gallantly, Sayyid Khán Jahán, Rustam Khán, and others, but especially Bahádur Khán, Sayyid Khán Jahán's haráwal.

But as the war made slow progress, his Majesty ordered that the attacks upon Mau should be vigorously continued at the place where Khán Jahán

and Bahádur Khán had fought, and the other corps should also attack and take the Fort by storm. On the morning of the 20th Ramazán, therefore, [13th December, 1641], the Prince gave the Bakhshís of his own men the order to make a general assault, and sent word to Khán Jahán and Sa'id Khán to commence the assault on their side. Sa'id Khán delayed, but Khán Jahán faithfully rendered excellent service, and Rustam Khán and Bahádur Khán and many others distinguished themselves by their gallantry. They, from their side, and Rájá Jai Singh, Qulij Khán, and Allah Virdí Khán, from the other side, were firmly resolved to take Mau by assault. Rájá Jai Singh, and Allah Virdí Khán from the valley, Qulij Khán from the left, and the others from the right, succeeded to pass through the jungle, and managed to reach the summit of the mountain. In consequence of the continued fights on the preceding days, Jagat Singh had been so weakened, that he called in troops which he had posted to certain places to keep back the Imperialists; and Rájá Jai Singh, Qulij Khán, and Allah Virdí Khán, who were nearest to Mau, found the ascent easy. The few men that held the barricades opposite to them, could not offer serious resistance, whence it happened that they entered Mau before Khán Jahán and Bahádur Khán had come up. Jagat Singh had before taken his family and treasures to Tárágarh, and had remained alone in Mau; but when he saw the luck and the successes of his enemies, he took his sons and dependents who had escaped the sword, and fled.

Two days after [15th December, 1641], Açálat Khán reported to the Prince that the besieged in Núrpúr, considering Jagat Singh's cause hopeless after the fall of Mau, had at midnight deserted the Fort, which was now in his possession.

On the 23rd Ramazán [16th December, 1641], the Prince sent Prithí Chand, zamíndár of Chambah, whose father had been killed by Jagat Singh, to court. Mau was left in charge of Rájá Jaisingh; Tihári was garrisoned by Qulij Khán; Damtal by Gokuldás Sísauidiah; and Pathán by Mírzá Hasan Çafawí. A large detachment was told off to cut down the jungle and widen the roads in the neighbourhood of Mau.

The Prince then returned with Bahádur Khán and Açálat Khán to court, when he arrived six days later.

On 1st Shawwál [23rd December, 1641], the Prince received orders to bring Jagat Singh either a prisoner or dead to court. Prithí Chand received the title of Rájá and a mançab of 1000, with 400 horse, and was ordered to return to Chambah, to collect his men, and to occupy a hill near Fort Tárágarh, the possession of which was necessary before the Fort could be taken. Tárágarh in fact belongs to Chambah; but Jagat Singh had taken it by force.

On 5th Shawwál [27th December, 1641], the Prince reached Núrpúr

with Sayyid Khán Jahán, and sent Sa'id Khán with his sons to Jammú. Bahádur Khán and Açálat Khán with nearly 2000 horse were sent to Tárágarh. Rájá Mán Singh of Gwáliár, the sworn enemy of Jagat Singh, joined Prithí Chand, in order to attack Tárágarh from the rear.

Although the fort was high, and difficult of access beyond all expectation, the Imperialists commenced the siege. * * * Jagat Singh seeing that he was vigorously attacked from all sides, was now sorry that he had rebelled against his Majesty, his benefactor, and addressed Sayyid Khán Jahán to intercede for him with the Prince. The Prince recommended him to the mercy of the emperor. Tárágarh was to be handed over to the Imperialists, and was to be destroyed with exception of certain houses which at Jagat Singh's request were to be left as dwelling-places for his servants, and as store houses for his property. The fortifications of Mau and Núrpúr were likewise to be levelled.

This was done. Jagat Singh invited Sayyid Khán Jahán to dismantle Tárágarh. The Sayyid then ordered his relation Sayyid Fírúz to destroy the Sher Háji bastion and other fortifications.

On Thursday evening, 19th Zil Hajjah [11th March, 1642], Jagat Singh paid his respects to the Prince. Najábat Khán was ordered to make a settlement for the whole district. Bahádur Khán and Açálat Khán were left in Núrpúr to dismantle the bastions, and the Prince with Sayyid Khán Jahán and Jagat Singh together with his sons went to Court.

On the 25th Zil Hajjah, Jagat Singh and his sons, each with a *fautah* round the neck, were presented to his Majesty, who pardoned them.

On the 19th Muharram, 1052 [10th April, 1642], Rájá Jagat Singh and Rájárúp, his son, who had escaped the fire of his Majesty's wrath, were reappointed to their former rank and office. Soon after, Jagat Singh went with Dára Shikoh to Qandahár, and was made commandant of Qalát. In the 17th year of Sháhjahán's reign, Sa'id Khán was made governor of the Qúbah, and Jagat Singh, who could not agree with him, was sent with the army to Badakhshán (1055), whither his son Rájárúp accompanied him. He occupied Khúst, Saráb, and Indráb, and erected between the last two places a strong stockade with masonry towers, and successfully repelled the attacks of the Uzbaks. Leaving a strong garrison in his stockade, Jagat Singh, in Ramazán 1055, returned to Panjshír, bravely fighting on the road under heavy snowstorms. Ill-health compelled him to go to Pasháwar, where he died in the end of the same year [January, 1646].

Rájárúp was made Rájá, a commander of 1500, with 1000 horse, and was left in possession of his zamíndáris. But Murshid Qulí, the Faujdár of Dáman i Koh i Kangrah, in the beginning of 1056, was ordered to take away Tárágarh. He did so, and Tárágarh was henceforth garrisoned by Imperialists.—

The manuscript belongs to the Hon'ble E. C. Bayley, for whom it was copied from the original in his possession of the Rájá of Núrpúr. The copy ends abruptly, and it is probable that it has not been completed. The Rájá was unwilling to allow the copy to be taken, and now states that the original has been lost. We must therefore make the best of the present text. The work is in two parts, the first part ends on page 57, where the second part begins with the words अब राजा मानधाताके कवित्त जगत सिंह का पौत्रा राज-रूप का पुत्र मानधाता ॥ "Now begin the poems of Rájá Mándhátá, grandson of Jagat Singh, son of Rájárúp, Mándhátá." The Muhammadan historians do not mention any person as Mándhátá : the succession, according to them passed from Jagat's son Rájárúp to another son, Bháo Singh, who turned Musalmán, and took the name of Muríd Khan. Who this Mándhátá was is therefore uncertain, but the word is a title rather than a proper name, and may therefore be used of some person known to the historians by a different name.

I now give text and translation of the invocation and the first twelve kavitas.

ओं श्रीगणेशाय नमः ॥

गजमुख सन्मुख हो तंहो ॥

विघ्न मुख होए जात ॥

ज्यों मग परत पराग पग ॥

पाप पहार विलात ।

कवित । उमयो हे समुद्र ज्यों साह जहां दिल्ली पत ॥

कै लाख दल साज डेरा आन कर्यो हे ॥

सुंदर सुखे इत जगत सुमेरु भूप ॥

मउ के मदान बीच खंभ गाड लर्यो हे ॥

आडें करि गांटी कोऊ दूर ते' न कुहन पावे ॥

थांभी पातसाही सनमुख सार भार्यो हे ॥

मानतन आन सभ बांधि वासुदेव सुत ॥

जानो वनजारा एक टांडा लाद पर्यो हे ॥ १ ॥

भयो है मवास वासुदेव को जगत सिंह ॥

भई देश देश बात जग से कहानी हे ॥

चौकस हे चऊँ उर वेर रावो साह दल ॥

मारत हैं सांभ मोर यह जोय जानी हे ॥

चलत न बाट घाट रहे न उमराउ ठाठ ॥
 खाने बिन पानी बिन फौजे विललानी हे ॥
 सुनके खबर पातसाह जीय संसा पर्यो हे ॥
 मउ की मही मयारो मौत की नसानी हे ॥ २ ॥
 राजन के राजा महाराजा जू जगत सिंह ॥
 तेरो तरवार भरो भेख हे भवानी को ॥
 कहे कवि राइ एसा वीर रच्यो जगत सिंह ॥
 आग सी जरत लोभ लोह की निसानी को ॥
 अजो लग राउ रंक खेत मे खपत जात ॥
 जेते केते छोडे वडे पूत तुरकानी को ॥
 जनमे ते मारे अजनमे सकुच डारे ॥
 तूं नहार्यो भेट पेट हार्यो मुगलानी को ॥ ३ ॥
 एके हरी हर एके कामना कल्पतरु ॥
 एके दिनकर यहे तप तेज जाही में ॥
 एके नभ धूय तारो शेषनाग धर्यो भार्यो ॥
 उदध के पर हड्डी बांधो कल याही मे ॥
 एकै मरदानो जोर जालम जगत सिंह ॥
 तेग त्याग सत्तशील प्रभु पूजा जाही में ॥
 एके नभ एके वाय दूसरे वताऊं काहे ॥
 एक पातसाह एक राजा पातसाही में ॥ ४ ॥
 कीने एसे जोर जंग जग में जगत सिंह ॥
 कूटे हे अलगन धनख बाण कसके ॥
 फूट गई फौजे और कूटे हे कटक सभ ॥
 ए कटक कीने केते घाउ सभके ॥
 कहत गंभीर वर वीर वासुदेव सुत ॥
 हने हे गजराज तेऊ रहे हे वन वसके ॥
 डार मग काल खाल खाल लेत उाढवे को ॥
 कुंजर को सोस गरे ईस नाच्यो हसके ॥ ५ ॥
 जिन मखयाला लियो हे भूप बीच कियो
 भई हे खबर देश देश यह बात हे ॥
 जां के दल चढत हलत गढ कोट

घास ज्यों मवास जित कित रोठो जात है ॥
 राजा वासुदेव सुत कहत गंभीर राय ॥
 वेरन के नेर खलभेल सेां विद्यात है ॥ ६ ॥
 गोविन की मारी डग डोली सी फिरत पौजे ॥
 और पातसाहन की कही उर सलई ॥
 मरद मैदान से वेठो है जोत खंभ ॥
 गाड चक्रीहं के बीच कीच रुधिर की लई ॥
 सूरे सरदार मारे जित कित रंड डारे ॥
 लीनी हर हरख गही रंड मालई ॥
 साहन सेां कर रुठ वेठो देश मऊ मांभ ॥
 जगत हलायो एक जगता न हालई ॥ ७ ॥
 खंभ बांध खान मार्यो खेत चढ मीर मार्यो ॥
 केते उमराउ मारे होहे नहि रान कोां ॥
 कावली कलवास लाख क्यों न आये ॥
 और चारो पांचो सहजादा आये वान बांधके ॥
 केते उमराउ और केतक सुपाह भेजे ॥
 जौ आप क्यों न आये पातसाह तुरकाने कोां ॥
 कवहं कवहं सुध होत लसकर मांभ ॥
 जगता न जाने जीय और मरदाने कोां ॥ ८ ॥
 कूटे उमराउ और साह के हसम लूटे ॥
 हाथी हय ऊठ नको धारा हांक ल्यायो है ॥
 सुंदर कुकवे एक पेड़ पर राखी मैड ॥
 चकत्ता सेां खंभ गह दावा कै दिखायो है ॥
 भूख मार रहै सभ काह ते न खुस्यो ककु ॥
 ताते साह जहां भूपके आजज मनायो है ॥
 जीवन प्रमाण तेरो जग में जगत सिंह ॥
 जेतो पियो ते अमृत तेतो ही पचाया है ॥ ९ ॥

॥ सिवैया ॥

श्री जगता जग सांइ कियो पत राख लई महावीरन की ॥
 धाड़ मिले रजपूत बहादर मार करी रन तीरन की ॥

बारहीं बार पुकारत फौजन भूल गई सुध मीरन की ॥
जेइ आइ मिले सुकराना भयो गए सीरनि बांटन पीरन की ॥ १० ॥

॥ कवित्त ॥

राजन के राजा महाराजा जू जगत सिंह
कंपत सदा को साह तेरो तरवार ते ॥
तेरे ही अवध गयो है [दुयन] सभते
तो सरह बांधी सिंधु वार पार ते ॥
राजा वासुदेव तनय कहत गंभीर राय
थांभ्यो है पहार सभ तेरे भुज भार ते ॥
उत्तर नरेश देश देश में सुजस तेरो
राउ राजा रोज पावे तेरे दरबार ते ॥ ११ ॥
जेतो जोर ऊतो तेतो चकत्ता लाय थक्यो
भेजे सब सूबा अब कौन को पठावेगो ॥
सुंदर सुकव जेइ आए तेइ सूर कोने
मऊ सोम सिंह रूप आगे कौन आवेगो ॥
कलि में अमर भयो जगता प्रसिद्ध
जग भूभी पातसाही नव खंड कीर्ति गाये है ॥
लक्ष्मी नरायण सहाय तेरो रैन दिन
भक्त मार साह जहां चूमके मनावेगो ॥ १२ ॥
हेंदु सुलतान गह गेहु ज्यों पटके मीर
भीर अरंभ जनम जेज तेज तत्ता है ॥
माई दास बल वेन प्रगट्यो पुरूरव
किधों मानो मान धत्ता है ॥
ढाहे गढ कोट राजा राउत के ओट
दीजे कौन जोट एक चोट को चकत्ता है ॥
हाथ का मुकत्ता मन राम नाम रत्ता
चारो मद मत्ता जोर जग में जगत्ता है ॥ १३ ॥
सकुचै सराजी सुन सटके समरकांदी
दुनियां को दौर दुति दीनी है दिल्लीस की ॥
बलख बुखारै न पलक लागै रैन संकत
सिपाहां पे संक सभ भेस की ॥

कहत गंभीर राय राजा वासुदेव सुत
तो लों करो राज जो लों साथे मन शेष की ॥
खुरी में कंधार लई खुरासान रोर गई
परी है हरेउ हई जगता नरेस की ॥ १४ ॥

॥ सवैया ॥

श्री जगता जग सिंह चण्डी धर धूम मची चह्मं चक्र में चाला ॥
नाउ विना चङ्ग लांउ लघी जों वि हाथहीं हाथ भयो जैसे नाला ॥
जारेज जूहे कै कोटस और धूरं की धूर भयो नभ काला ॥
पांच मलका गहै पल एक में कूगएल में मखयाला ॥ १५ ॥

॥ कवित्त ॥

तेरी तो कुमान कुरमान में हिरान रही
तीर रहै तरकस में एतो बोल बाली है ॥
सैदा खां नवाव पे कवाव भूले बार बार
जगता ने खेत मांघी धुंधट पट खाली है ॥
चारो सहजादे पातसाह आप आयो
मऊ के मदान मांभ वरका की होली है ॥
वासुदेव नंद जू नरेद जग माह भयो
सारी पातसाही ते तराजू पाइ तोली है ॥ १६ ॥
रोस के उधान कीनो राम राम चित भीनो
शैल न वरख वान जगत हिलाए है ॥
करवर धारा रिपु शीस भूज कारा न्यारा
हर हारा रन ते पुकारा प्रेत आयो है ॥
धकाधक भीर चीर चुभट समीर तीर
प्रवल पैठाण तेरे लोह ते गलाए हैं ॥
सुकव गंभीर राय जगता नरेश जग
शत्रु मारे खेत गह गरदमें मिलाए हैं ॥ १७ ॥
रिस के उठान कीनो बांध लीने रिपु तीनो
सवै जिय जानी बडी कलह मिटाई है ॥
सूबेदार फौजदार राउ राजा बार पार
सात सिंधु लों हकात बली बल दाई है ॥

जीवन जनम धन्न तेरो प्रवल पैठाण पत
अचल चलाय रिपु भवन में पिटाई है ॥

सुकव गंभीर राय जगत नरेन्द्र इंद्र
तेरे कर उरत सब सुधा हिलाई है ॥ १८ ॥

श्री जगता रण सिंह चलो धरणी धसको फोन शेष के टूटे ॥
दिलीश्वर के दल में गल वहल आए चहं दिस केहर घूटे ॥
भभके तभ सुंड ते शोणत पूरण भागए ते कुंभ सत्तर तूटे ॥
राय गंभीर कहै जीय सांच बडो वल वाऊ मतं गज कूटे ॥ १९ ॥

Translation.

Om! Reverence to S'ri Ganesha!
Thou of the elephant face, be present, then
Thy face is conquering obstacles,
As when the foot alights on the road to Parâg,
The mountain of sin melts away.

हेर जात = जयत है 'is conquering.' जात for जयत, with substitution of अ for य, just as in the fourth line विज्ञात for विजयत. Or if जात is the present tense of जाना, which is the most natural way to take it, we must make विघ्न the nominative and render "obstacles depart from before thy face"; मुख would thus have to be expanded into तुम्हारे मुख से. The first translation seems preferable. पराग is of course प्रयाग. The elision of य is frequently noticed in these poems, the dialect of which may be described as seventeenth century Rājput Hindī of an extreme northwestern type, verging on Panjābī and the Doghrā dialects of the hills.

The next kavitt has already appeared in the Proceedings above quoted, and is here reproduced in order to complete the translation.

1. Swelled like the sea Shāh Jahān, lord of Dilli,
Arraying an army of many lakhs, he came and pitched his tent.
Beautiful, fair-faced, is here Jagat, king of Sumerū,
In the plain of Mau planting the pillar he fought.
Making hedges and entrenchments, that no one might touch him from afar,
Restraining the Pātshāh's forces, he swept with the steel.
The son of Bāsudev coming arraying all his honored ones,
Like a banjārā, having loaded his *tāndā*, has alighted.

दिल्ली is of course Delhi, in its old Hindī spelling.

The Muhammadan historian does not say that the Emperor himself was present at the siege, and from other parts of Gambhír's own poems, it would appear that he was not there, though in others he is said to have been present. We must therefore refer जान कयो न to the Pādishāh, but to the army. The grammatical construction is excessively loose through-

out the poems. आन is in Hindí often an irregular indefinite participle from आना, to come, though it may also be from आनना, to bring. In Panjábí, आण is more frequently used in the sense of "having come", which I have, therefore, adopted here.

सुंदर may refer to Jagat Singh, whose beauty is often mentioned in the poems, or it may be an allusion to Kabrái Sundar, whom the Emperor sent to visit Jagat just before the rebellion. This Sundar is always alluded to by Gambhír as सुंदर कुकब, or 'Sundar, the bad poet'. He himself is unvaryingly सुकब, 'the good poet'.

मदान बीच is a regular Panjabicism. In that dialect, बिच is the regular sign of the locative instead of में. The constant mention of the 'Mau ká maidán' is explained by the fact that Jagat, although he fortified and garrisoned all his strongholds, did not himself stay in any one of them. He entrenched himself in the plain of Mau, at the foot of some hills covered with jungle, where he had a villa and met his enemies there. There is the regular old smack of Rájpút daring and fool-hardiness in this, in fact throughout the whole affair, Jagat and his son seem to have been playing at rebellion; perhaps his easy successes over the Muhammadans of Kábul may have put into his head the idea that it would be rather good (Rájpút) fun to have a brush with the Pádisháh and his forces. खंभ गाड, planting the pillar, the रण खंभ, or pillar of war, just as we plant a standard in the middle of a camp.

सभ Panjábí and Sindhí for सब. The र of सर्व on disappearing aspirates the remaining consonant.

टांडा is the encampment of bullocks made by the banjárás. Several towns in India are named Tándá from this cause.

मानतन I have taken as a plural of मानित, honoured, noble. If divided into मान तन, it is difficult to make sense of the passage.

2. Jagat Singh, son of Básudev, was their protector;
The story went from land to land, it is a tale in the world;
He is vigilant on all four sides to hem in the Sultan's army,
He smites them morn and eve, this he knew in his mind,
One goes not by road or ghát, the princes remained not staunch,
Without food, without water, the armies melted away.
Hearing the news doubt fell on the Pátsáh's mind.
In the midst of the plain of Mau there is slaughter unto death.

If we followed the Muhammadan historian's account, it would be perfectly compatible with the text, so loose and vague is its style, to translate this passage quite the other way. Thus in the first line by making साहदस the nominative we might render—

"The Sháh's army were vigilant on all sides to hem *him* in."

But this would not agree with the assertion that the 'Umrao' did not remain firm or staunch; nor with the anxiety of the Sháh, nor with the

general scope of the book, which is entirely in glorification of Jagat Singh.

वेर रावो I take to be for Hindi वेड़ रचना, "to remain surrounding"; वेड, or वेड, (Sanskrit वेष्टन), and रावो, for रचवो, the old infinitive in वो (वा), which is constantly used in these poems, as in most Rājput dialects, though it has not left any very distinct traces in classical Hindi.

विल्लहानी हे I take to be a reduplicated form of विल्लान in the invocation, which, if derived from a root वि + ल्, would mean 'to melt away.' The last line contains the word मयारो, which is not clear. I have translated it as if it were the same as Chand's word मझारि, a lengthened form of मझि = in; but this is not quite satisfactory. नसानी would be a verbal noun from नसाना, to destroy (नाश); literally there is a destruction (as) of death, मौत = Arab. موت. This line needs further elucidation. It has been suggested that it should be मही मयारो, in the land (मही), O friends, Persian, ملا, with म for मे, but this also seems strained.

3. King of kings, great king, lord Jagat Singh,
Thy full sword is a disguise for Bhawani.
Quoth Kavi Rāi, such a hero has been made, Jagat Singh
Burns like fire the thirst for blood of (thy) kettledrum.
To this day, prince and beggar in the field lie rotting,
As many big sons of the Turk woman as they left there.
The born they slew, the unborn they destroyed through fear,
Thou didst not slay, the meeting destroyed the womb of the Mughalani.

तेरी तरवार भरी perhaps means "the weight of thy sword", but this would require की, which was erroneously given in my former extract. I now take भरी as passive part. of भरना, and render "thy full sword" in the sense of the sword being satiated with slaughter. रचो has been made, or perhaps 'has been described', as रचना, like Greek ποιῶν, means often to make verses. The next line has been suggested as divisible in another way thus, खेत मेख पत जात "the (tent) pegs have fallen in the field," but this is deficient, inasmuch as it supplies no correlative to the "tall sons" of the next verse. पत जात is hardly in our author's style, though he may have, as I suspect also in other places, here used purposely an archaic phrase. Another rendering would be "in the fields of rich and poor", the fields round Mau being naturally the property of Jagat Singh's Rāos and of his poorer subjects, while the Turks cannot well be called Rāos. कै is of course the old Hindi genitive, modern का. It will be observed that the employment of the three genitive participles is totally at variance with the practice of the modern language, where we should expect तुरकानी के पुत in the plural.

The last line may also be translated differently by dividing तू नहार्यो (for निहार्यो, from निहारना 'to look'), 'thou didst look, (and) the meeting, etc.' As given above the sense would be 'thou didst not smite, but the mere meeting with thee made or destroyed.'

The idea of the women miscarrying through fear, is the same as that in the *Rámáyan* of Tulsí Dás (*Sundara Kánd*), where Hanumán is leaving Lanka—

चलत महा धुनि गरजेउ भारी ॥

गर्भ अवेउ सुनि निशचर नारी ॥

Going he roared with mighty sound ;

Hearing it, the wombs of the she-fiends melted.

4. There is one Hari and Hara, one wish-granting tree of desire,
One sun, this one, in whom is warmth and light,
One comet in the sky, (one) Seshnág weighed down by the earth ;
(Who) bound the further limits of the sea in this Kali (yug).
One manly Jagat Singh, terrible in strength,
When abandoning the sword, virtuous, in whom is worship of the lord.
One sky, one air, why should I describe a second,
One Pátsáh, one Rájá in the Pátsáhi.

The object is clearly to extol Jagat as the one unrivalled hero of his time. धूय तारो I take for धूयां तारा = धूमकेतु comet. धर्यो भार्यो is a puzzle ; if धर्यो is for धरा or धरणी 'earth', then भार्यो is a verb भरना, which can only mean 'weighed down, or loaded', but the rendering is scarcely satisfactory on grammatical grounds, and the fourth line is also difficult to make sense of. The sixth line probably means that, though terrible in war, yet when he laid aside his sword, Jagat was mild and pious, and the last contains the oft-repeated sentiment that, though Sháhjahán was sole Emperor, yet Jagat was no less an independent Rájá.

5. Jagat Singh hath made such mighty wars in the world ;
Arrows were discharged from countless tight-drawn bows ;
The armies were crushed, and all the camps were broken up ;
This camp has dealt how many wounds to all.
Saith Gambhír, great hero, son of Bāsúdev,
The elephant lords have been smitten, they have remained dwelling in the forest,
Rending the deer, stripping the skin, taking the hide to wear
An elephant's head (hanging) from his neck ; Shiva danced laughing.
6. He who took Makhayâlâ, placed a king therein,
The fame of it was in every land, this is certain ;
Whose army going up (to war), shaking castles and forts,
As cattle (eat up) grass, with all goes fighting.
King, son of Bāsúdev, saith Gambhír Rái,
The city of thy enemies is fainting with alarm.
7. Smitten by bullets, with trembling steps the armies retire,
And the news hath pierced the heart of the Patshah.
The hero is sitting in the plain (by) the pillar of victory,
Planting it in the midst of boulders by reason of the mud and blood.
Heroes and chiefs were slain, all the corpses were torn ;
Hara took rejoicing, he seized the garland of corpses.
Fighting with the Shah, he sits in the land of Mau ;
The world was shaken, Jagatá alone was not shaken.

On the above three kavitts some notes may now be offered. It is to be hoped that it will be understood that this translation is not put forward as authoritative, but merely as an attempt to get some meaning out of these rugged lines, and that hints and suggestions will be afforded by Hindī scholars in further elucidation. It will be observed that the past tense in such words as *चने चें*, *मारें*, and others, has been translated as a passive participle. This it is undoubtedly by origin, and it may be admitted that in these bardic verses, as in the early Vaishnava poems in Bengali, it is used in this sense in the absence of any *nomen agentis*. Also the phrases *जिन कित*, and *जेने केने* literally "as many (as there were), so many", are in fact equivalent to "all", and have been so translated.

In kavitt 5, line 2, the word *कसके* is literally "having tightened", and the only way to make sense of the line is to refer this to the bows. The sense is however rather involved, and can only be made clear by inverting the order of the words thus *अनगन धनख कसके*, "having strung countless bows", *बाण दूटे चें* "arrows have have been discharged".

Kavitt 6, line 1. The allusion here is apparently to some previous exploit of Rājā Jagat. I do not know where the Makhayālā referred to is. Mr. Blochmann finds "two places of that name, one *مکھیالہ*, the other with long ā, *ماکھیالہ*. The latter is mentioned in the *Āin* as a strong fort on a mountain in the Sindh Sāgar Dūāb. There is little water to be had; a salt mine is here and temples. The inhabitants are Jānūhās. The former is mentioned as a village where Shāhjahān once halted and hunted on his way from Kashmīr to Lāhor." It lies somewhere on the west bank of the Chanāb, and I should be inclined to look for it north of Kariānwālā and Tāndah, where there was good sport to be had, when I was Assistant Commissioner of Gujarāt fifteen years ago. The other, or Mākhyāla, seems to be somewhere between Jogī Tilā Hill and Pind Dādan Khān.

In line 4, *सवास* would seem from the context to be the Arabic word *مواشي* 'cattle', and not the Hindī *सवास*, protection, as the latter does not make sense.

K. 7, l. 4 *चकील* is a word unknown to me. It would seem to mean boulders, round stones; *की लर* = *के लीये*.

8. Fixing the pillar he slew the Khāns, going up to battle he slew the Mīrs.
How many chiefs were there not slain in the fray?
Why did not Kabulis and Kizilbashs come by the lakh,
[Why did not] four or five Shahzadas more come with arrows set (in their bows)?
How many chiefs and how many soldiers has he sent?
Why did not he come himself, the Padshah of the Turks?
Ever and ever being alone in the midst of the army,
Jagatā did not know in his heart any other manly ones.

1. 2. the meaning of *चो चो* is not clear; I have rendered it as if it were for *हर चो*.

1. 3. *कलबास* is always found in connection with names of races inhabiting Persia and Afghánistán, and is therefore conjectured to be a corruption of the word *قزلباش*.

1. 7. *सुध* has many meanings, it is here taken to mean 'alone', in the light of the rendering of the next line.

9. The chiefs were scattered, and the servants of the Shah were plundered,
Elephants, horses, and camels led by the nose-rein he has driven and brought in,

.

Why did all remain astonished, nothing was plundered from him.

Sháh Jahán dejected begged for pardon.

Life indeed is thine in the world, Jagat Singh :

As much nectar as thou hast drunk, so much indeed thou hast well carried.

Lines 3 and 4 are obscure, and are therefore left untranslated, as the meaning which they seem to bear is not easily to be got out of the words.

1. 5. *Khusyan*. In Panjábí *khusná* means 'to be plundered'.

1. 6. The word written *jhupke* is not certain. If the reading is correct, it would, I think, mean 'bowing', or metaphorically 'depressed'. This is confirmed by the next two words, *ájiz* (Arabic, عاجز) *manána*, i. e. to confess oneself weak, to beg for pardon.

1. 8. *Pacháná* or *pachauṇá*, Panj., literally 'to digest', but freely used in conversation in the sense of shewing that one has digested, that is, shewing by one's actions that one worthily bears, or is worthy of, honor, rank, or the like. The bard appears to mean that Jagat by his actions has carried immortality; this he expresses by saying he has drunk *amrita*, and has digested it, so that it gives him strength and heroism, which he shows in the war he is now carrying on.

10. The Lord of the world has made Sñ Jagata lord, he has undertaken the protection of the heroes,

The warlike Rajputs have run to join him, they have made a smiting with arrows of battle,

Again and again he shouts to his hosts, the caution of the Mīrs went astray,

Whosoever came and joined them became faint-hearted, they have gone to divide the sweetmeats of the Pīrs.

1. 4. This may mean that they have to make offerings (*śirni* = شیرینی) to their saints, to invoke their aid, being discouraged by their defeat.

11. King of kings, great king, lord Jagat Singh,

Trembles over the Shah at thy sword ;

Thy era has been established in all [lands],

Thy boundary is set up on both sides of the Indus,

King, son of Bāsudev, quoth Gambhīr Rái,

All the mountains are supported by the strength of thy arm.

King of the North, thy glory is in all lands;
 Chiefs and Rájás daily attend in thy court.

1. 3. The word translated 'lands' contains a letter which occurs frequently and seems to be meant for ॐ or ॐ , it is not clear which; the scribe uses a thick pen and forms his letters very small, so that it is sometimes not easy to decypher them. In neither case is the meaning clear; the word 'lands' is inserted conjecturally.

1. 4. This seems to allude to Jagat Singh's exploits across the Indus in Bangash and Afghánistán.

12. All his forces were wearied with bearing the shield;
 He has sent all his Subas, whom now will he send?
 Sundar the good poet celebrated all the heroes that came,
 On the confines of Mau (he is) like a lion, who shall come before him?
 In the Kali Yug, Jagatá has become immortal,
 Fighting, he has sung the fame of the Empire in the nine climes.
 Lachmi and Náráyan are thy aid night and day,
 Sháh Jahán abashed kissing shall honor thee.

(*To be continued.*)

Supposed Greek Sculpture at Mathurá.—By F. S. GROWSE, M. A.,
 B. C. S.

(With three plates.)

In 1836 Colonel Stacy discovered at or near Mathurá—for the exact locality does not appear to have been placed on record—a large and curiously sculptured block of red sand-stone, which has given rise to much antiquarian discussion. It measured 3 feet 10 inches in height, 3 feet in breadth, and 1 foot 4 inches in thickness, and the top was scooped out, or worn by time, into a shallow circular basin 16 inches in diameter and 8 inches deep. It was carved on both sides with a Bacchanalian group, the principal figure in which was supposed to represent Silenus and the whole to be the work of Bactrian Greek artists. It was deposited in the Calcutta Museum (where it still is) by the finder, who described it as a tazza, or rather a pedestal that had been used to support a large tazza or sacrificial vase. This opinion was endorsed by James Prinsep, and has prevailed to the present day, though I believe it can now be shown to be erroneous. The following description of the design (which I have not myself seen*) is abridged from one given by Bábu Rájen-

* Since the above was written, General Cunningham has very kindly sent me two photographs of Groups I and II. He conjectures that the stones were intended for altars (which, however, I do not think possible), and writes: "Your altar is a very interesting discovery, as the head-dress of the female holding the cup is that of the

dralála in his 'Antiquities of Orissa', where it is introduced *à propos* of the discussion regarding the amount of influence exercised by the Greeks on Indian art.

GROUP No. I.—In this are four figures, (*vide* Pl. XII) two male and two female, standing under masses of long lanceolate, pinnate leaflets, with tufts of small flowers. The leaves are like those of the Asoka; but the flowers more resemble the kadamb. The first figure to the right is a female dressed in a long skirt and upper jacket, with a narrow shawl thrown across the body. On her feet are shoes, and thick heavy rings round her ankles. Her left hand holds the hem of her mantle and the right is in the grasp of an amorous swain who stands beside her with crossed legs, resting his left hand on her shoulder. He wears close-fitting drawers, which simply cover his nakedness and extend to about the middle of the thighs, but leave his protuberant paunch exposed. A scarf, fastened in front with a sort of sailor's knot at the neck, hangs down his back behind. His feet are bare. The third figure is a female, dressed exactly as the first, but wearing elaborately worked bangles which cover nearly half the length of her fore-arm. In her left hand is a lotus-bud, while the right hangs down straight by her side. Near her feet are two covered vessels, one on either side. To the extreme left of the group stands a youth who appears to be a mere passive spectator.* He has no shoes and wears a flowered muslin tunic reaching down to the knee. A little above the ankle are marks which show that his under-garment is a pair of long close-fitting drawers. All four figures show traces of chaplets which had crowned their heads.† The leaves may be those of the vine or the ivy.

GROUP No. II.—The principal figure is a pot-bellied man, (*vide* Pl. XIII) seated in a wine-befuddled state on a rock, or low stool, with his arms supported by two attendants, who stand on either side of him. For dress he has only a wrapper, thrown round his loins, leaving his prominent paunch uncovered. One leg is raised on the seat, the other hanging down. On his head is a chaplet of leaves. The attendant on the right side is a male wearing a mantle fastened at the neck in front with a clasp. The right hand is stretched behind the central figure for its support. The attendant on the left is a female supporting the right arm of the drunkard. She wears a long skirt reaching to the feet, with a short, sleeved jacket over it. A necklace of five rows adorns her breast, and thick heavy jewels are pendant from

Indo-Scythian females of the old sculptures and of the hill women to the north of Simla at the present day. I take the seated figure to be the Scythian Hercules"—a suggestion which strikes me as the most plausible yet advanced.

* It does not so appear to me; but rather each of the male figures seems to be urging his female companion to do something about which they are hesitating.

† These are scarcely if at all perceptible in the photograph.

her ears. Before her stands sideways a small boy, naked, with his right hand resting on the thigh of the central figure. Before the male attendant is another boy in a dancing posture with the right hand uplifted. In front of the principal figure lies a flagon.

During the cold weather of 1873-74, I discovered the companion block to the one above described, of precisely the same shape and dimensions and carved with two similar groups of figures. These are shewn in the accompanying illustrations; and to distinguish them from the preceding are numbered groups III and IV (*vide* Pls. XII and XIII). The mound, out of which I dug the stone, is according to modern territorial divisions beyond the boundaries of the Mathurá township, and is included in the small village of Páli-Kherá. It is, however, only about two miles distant from the temple of Kesava Deva, and all the intervening space is dotted with mounds,—the ruins of the ancient Madhupuri,—in most of which Buddhist antiquities have been discovered.

GROUP No. III.—Here four of the figures are apparently the same as in No. I. The grouping and action, however, are different; and two additional figures are introduced, *viz.*, the principal personage, the so-called Silenus, who is seated with a cup in his hand, and the little boy at his knee, as in No. II. The cup is noticeable for a peculiarity in the handle, the lower end of which joins on, not to the bottom of the bowl, but to the foot of the cup.

GROUP No. IV.—The concluding scene of the drama, in which the cup has been drained and has had its intoxicating effect, is almost identically the same with No. II, already described.

In my opinion the later discovery disposes of the tazza theory. The two blocks of stone seem to be the bases of a pair of pillars forming the entrance to a shrine, rather than pedestals for sacrificial vases. Such an idea would probably never have been conceived but for the shallow basin at the top of the stone first found; but on comparison with the later discovery this is clearly seen to be nothing more than a socket for the reception of a slender upright shaft.

As to the subject which the artist intended to represent—Silenus may be dismissed at the same time as the tazza. Future research in Buddhist literature may result in the discovery of some legend which the three scenes, *viz.* the Plot, the Carouse, and the Effects of the Carouse, may be found to illustrate; but pending this, the principal figure may with great probability be regarded as the wine-bibbing Balaráma, one of the tutelary divinities of Mathurá, attended by his wife Revati and the other members of his family. A confirmation of this view is afforded by an ancient and mutilated statue at the village of Kukargama in the Sa'dábád Pargana of this district, which is apparently intended for Balaráma. He is stand-

ing under the conventional canopy of serpents' heads, with a garland of wild-flowers (*ban-mála*) thrown across his body; and while his right hand is raised above his head in wild gesticulation, in his left hand he holds a cup very similar to the one represented in the Páli-Kherá sculpture. His head-dress closely resembles Krishna's distinctive ornament the *mukut*, but it may be only the spiral coil of hair observable in the Sanchi and Amara-vati sculptures. In any case, the inference must not be pressed too far; for *first* the hooded snake is as constant an accompaniment of Sákya Muni as of Balaráma; and, *secondly*, I have in my possession another sculpture of an equally Bacchanalian character, which is unmistakeably Buddhist. This is a rudely executed figure of a fat little fellow (*vide* Pl. XIV), who has both his hands raised above his head, and holds in one a cup, in the other a bunch of grapes. The head with its close curling hair leaves no doubt that Buddha is the person intended; though possibly in the days of his youth, when "he dwelt still in his palace and indulged himself in all carnal pleasures." Or it might be a caricature of Buddhism as regarded from the point of view of a Brahmanical ascetic.

Finally, as to the nationality of the artist. The foliage, it must be observed, is identical in character with what is seen on many Buddhist pillars found in the immediate neighbourhood, and generally in connection with figures of Maya Devi; whence it may be presumed that it is intended to represent the Sál tree, under which Buddha was born. The other minor accessories are also with one exception either clearly Indian, or at least not strikingly un-Indian: such as the ear-rings and bangles worn by the female figures and the feet either bare or certainly not shod with sandals. The one exception is the male attendant in Group IV, with the mantle fastened at the neck by a fibula, and hanging from the shoulder in vandyked folds, which are very suggestive of late Greek design. But considering the local character of all the other accessories, I find it impossible to agree with General Cunningham in ascribing the work to a foreign artist, "one of a small body of Bactrian sculptors, who found employment among the wealthy Buddhists at Mathurá, as in later days Europeans were employed under the Mughul Emperors." The thoroughly Indian character of the details seems to me, as to Bábu Rájendralála, decisive proof that the sculptor was a native of the country; nor do I think it very strange that he should represent one of the less important characters as clothed in a modified Greek costume; since it is an established historical fact that Mathurá was included in the Bactrian Empire, and the Greek style of dress cannot have been altogether unfamiliar to him. The artificial folds of the drapery were probably borrowed from what he saw on coins.

A Rough Comparative Vocabulary of two more of the Dialects spoken in the "Nágá Hills".—Compiled by Captain JOHN BUTLER, Political Agent, Nágá Hills.

The plan adopted for designating the long sound of vowels has been the one previously explained in the Vocabulary, published in the Appendix to the Journal of the Asiatic Society of Bengal, Vol. XLII, Part I, for 1873.

<i>English.</i>	<i>Lhotá Nágá.</i>	<i>Jaipuriá Nágá.</i>
A, an, or one,	Ekha	Vánthé
Abandon, v.	Apiá	
Abdomen, n.	Opok	Vok
Above, prep.	Potso	Akho-nang
Abundance, n.	Khosha	
Accept, v.	Khialo	
Accompany, v.	Neniyá	
Accurate, a.	Ochocho	
Acid, a.	Théná	
Acquaintance, n.	Anánchiá	
Advance, v.	Vongává	
Adversary, n.	Ratá	
Adult, n.	Cháli	
Adze, n.	Opú	
Afar, ad.	Ekoni	
Affray, n.	Khondaka	
After, prep.	Silámo	
Afternoon, n.	Inching	
Air, n.	Umpúng	Pong
Alike, ad.	Khidi	Rorang
Alive, a.	Ekam	
All, a.	Hetobúlá	Phangtang
Alligator, n.	Erro	
Alone, a.	Aboti	
Altogether, ad.	Enika	
Ankle, n.	Chomhiek	
Anger, n.	Alom	Ringkhá
Annually, ad.	Inzú-inzú	
Ant, n.	Chemphiro	Sip-chák
Apiece, ad.	Mochangchang	
Armlet, n.	Ghoro	Chángká
Armpit, n.	Zongop	

<i>English.</i>	<i>Lhotá Nágá.</i>	<i>Jaipuria Nágá.</i>
Around, <i>prep.</i>	Hetobúto	
Arrow, <i>n.</i>	Otso	Látchán
Ascend, <i>v.</i>	Langheklingba	Kúo
Ash, <i>n.</i>	Khúr	Táplá
Ask, <i>v.</i>	Chúchánáchú	Chiéno
Asleep, <i>ad.</i>	Ipá	
Awake, <i>v.</i>	Phanthiá	
Axe, <i>n.</i>	Opú	Váká
Babe, <i>n.</i>	Ngaro	
Bachelor, <i>n.</i>	Chinghran	
Back, <i>n.</i>	Echen	Tám
Bacon, <i>n.</i>	Okoso	
Bad, <i>a.</i>	Umho	Achi
Badger, <i>n.</i>	Thembakso	
Bag, <i>n.</i>	Cikú	Khatong
Bamboo, <i>n.</i>	Chingsa, Chiro	Vá
Bark, <i>n.</i>	Ofú	Akhúon
Barn, <i>n.</i>	Oson	
Bat, <i>n.</i>	Shoshiro	Phákárang
Battle, <i>n.</i>	Oritso	
Beak, <i>n.</i>	Emé	
Beam, <i>n.</i>	Khiron	
Bear, <i>n.</i>	Seván	Sápá
Beard, <i>n.</i>	Khokháhúm	
Beat, <i>v.</i>	Langtháthá	Váto
Beef, <i>n.</i>	Masiso	
Behind, <i>prep.</i>	Silamoi	
Behold, <i>v.</i>	Zedá	
Below, <i>ad.</i>	Ochongi	
Best, <i>a.</i>	Tengtommhona	
Big, <i>a.</i>	Chopo	
Bill-hook, <i>n.</i>	Lopúkha	
Bind, <i>v.</i>	Chinga	Kháko
Bird, <i>n.</i>	Woro	Vo
Bitch, <i>n.</i>	Horo-o-kui	
Bite, <i>v.</i>	Kégá	
Black, <i>a.</i>	Niká	Aniak
Blind, <i>a.</i>	Chokúá	Mitdúok
Blood, <i>n.</i>	Echen	Hé
Blue, <i>a.</i>	Miaga	Aham



<i>English</i>	<i>Lhotá Nágá.</i>	<i>Jaipuria Nágá.</i>
Boat, <i>n.</i>	Orhúng	Khuongkho
Body, <i>n.</i>	Ochok	Sák
Bone, <i>n.</i>	Orú	Árá
Borrow, <i>v.</i>	Ochiápúa	Námo
Bough, <i>n.</i>	Piápiro	Aphák
Boundary, <i>n.</i>	Akhi	
Bow, <i>n.</i>	Olo	Doákháp
Box, <i>n.</i>	Inkhi	Temá
Boy, <i>n.</i>	Núngori	Nátá
Brains, <i>n.</i>	Kicho	
Brass, <i>n.</i>	Rempam	
Break, <i>v.</i>	Khúcháká	
Breast, <i>n.</i>	Tiki	Tánkhú
Breath, <i>n.</i>	Ethékechena	
Bridge, <i>n.</i>	Opho	Si
Bring, <i>v.</i>	Hánáíá	Vánro
Broad, <i>a.</i>	Unzoá	Khádong
Broadcloth, <i>n.</i>	Sinio	Khăt
Broken, <i>part.</i>	Chágá	
Brother (elder), <i>n.</i>	Atá	Ipho
Brother (younger), <i>n.</i>	Ango	Iná
Brother-in-law, <i>n.</i>	Oázi	
Brow, <i>n.</i>	Oto	
Buck (deer), <i>n.</i>	Opúng	
Buffalo, <i>n.</i>	Ziz	Lé
Build, <i>v.</i>	Kitsoá	Húono
Bull, <i>n.</i>	Maso-opúm	
Bullet, <i>n.</i>	Chingiching	
Bundle, <i>n.</i>	Unkhap	
Burden, <i>n.</i>	Ohá	
Burn, <i>v.</i>	Khuteta	Tháko
Bury, <i>v.</i>	Shotetá	Bino
Buy, <i>v.</i>	Shitágá	Río
Calf, <i>n.</i>	Opungro	
Calf (of leg), <i>n.</i>	Unrá	
Call, <i>v.</i>	Cháhé	Rúo
Cane, <i>n.</i>	Orr	
Cap, <i>n.</i>	Kive	Kafok
Carry, <i>v.</i>	Ohanga	Kapkáto
Cat, <i>n.</i>	Onioro	Miáñ

<i>English.</i>	<i>Lhotá Nága.</i>	<i>Jaipuria Nága.</i>
Catch, <i>v.</i>	Rhemhátá	Luo
Charcoal, <i>n.</i>	Mihá	Vanhi
Chase, <i>v.</i>	Pháná	
Cheap, <i>a.</i>	Tétsúá	
Cheek, <i>n.</i>	Eio	Than
Chicken, <i>n.</i>	Honororo	
Chin, <i>n.</i>	Khokha	Ká
Clean, <i>a.</i>	Khidi	
Cleave, <i>v.</i>	Sisotava	
Cloth, <i>n.</i>	Oso	Khat
Cloud, <i>n.</i>	Potso	Phúam
Cock, <i>n.</i>	Honohámpúng	
Cold, <i>n.</i>	Ungúng	Aki
Come, <i>v.</i>	Rúá	Káro
Conceal, <i>v.</i>	Unbhoiábiá	
Cook, <i>v.</i>	Ekúá	Puono
Cord, <i>n.</i>	Ozú	
Cost, <i>n.</i>	Chigú	
Cotton, <i>n.</i>	Khúnkho	
Cover, <i>v.</i>	Lhebiathá	Káháp
Count, <i>v.</i>	Khá	
Cow, <i>n.</i>	Mású	Mán
Cow-dung, <i>n.</i>	Másúsú	
Cowree, <i>n.</i>	Phúho	
Crazy, <i>a.</i>	Zévái	
Crooked, <i>a.</i>	Khánkhúá	Akúáng
Crow, <i>n.</i>	Káshá	Vákhá
Cry, <i>v.</i>	Kiávákhá	Sapo
Cubit, <i>n.</i>	Sibúá	Dáká
Cup, <i>n.</i>	Opú	Bánchá
Cut, <i>v.</i>	Nangá	Dúáko
Dark, <i>a.</i>	Mengá	Rangiek
Daughter, <i>n.</i>	Otsoi	
Day, <i>n.</i>	Inkhá	Rángi
Dead, <i>a.</i>	Shitogá	
Deaf, <i>a.</i>	Enopúngá	
Dear (costly), <i>a.</i>	Shikok	
Deer, <i>n.</i>	Oso	Kéhé
Descend,	Chéiá	
Devil, <i>n.</i>	Chújomho	

<i>English.</i>	<i>Lhotá Nága.</i>	<i>Jaipuria Nága.</i>
Dialect, <i>n.</i>	Oi	
Difficult, <i>a.</i>	Kénghá	
Dig, <i>v.</i>	Chiá	Thúo
Disease, <i>n.</i>	Perá	
Distant, <i>a.</i>	Ekoni	
Divide, <i>v.</i>	Chitava	
Dog, <i>n.</i>	Phúro	Hú
Door, <i>n.</i>	Hánkha	
Dove, <i>n.</i>	Vékhú	Phokphelerú
Drink, <i>v.</i>	Uiá	Joko
Dry, <i>a.</i>	Eking	
Ear, <i>n.</i>	Eno	Ná
Ear-ring, <i>n.</i>	Impejä	Nátho
Earth, <i>n.</i>	Loko	Há
Eat, <i>v.</i>	Choá	Cháo
Egg, <i>n.</i>	Eteho	Ati
Eight, <i>a.</i>	Chizá	Isat
Eighteen, <i>a.</i>	Mechú-me-chizá	Ichi-van-isat
Eighty, <i>a.</i>	Ekhá-chizá	Ruak-isat
Elbow, <i>n.</i>	Khétso	Dákú
Elephant, <i>n.</i>	Sotso	Púok
Eleven, <i>a.</i>	Tero-sékha	Ichi-vanthé
Evening, <i>n.</i>	Mitogá	Rangjá
Eye, <i>n.</i>	Omhie	Mit
Eyebrow, <i>n.</i>	Mhiékhó	
Eyelash, <i>n.</i>	Mhiémho	
Eyelid, <i>n.</i>	Mhiekehing	
False, <i>a.</i>	Echengcheng	
Fat, <i>a.</i>	Thúá	Atat
Father, <i>n.</i>	Apo	Vá, Ivá, or Apá
Feather, <i>n.</i>	Hámphú	Nap
Feed, <i>v.</i>	Chotúgá	
Female, <i>a.</i>	Eloi	
Fetch, <i>v.</i>	Hánáíá	
Fever, <i>n.</i>	Ráthátá	Achát
Few, <i>a.</i>	Echik	Ané
Fifteen, <i>a.</i>	Tero-si-múngo	Ichi-ván-bángá
Fifty, <i>a.</i>	Tinián	Rúák-bángá

<i>English.</i>	<i>Lhotá Nágá.</i>	<i>Jaipuria Nágá.</i>
Find, <i>v.</i>	Khondakorúá	Ichúo
Finger, <i>n.</i>	Ingro	Dáksú
Fire, <i>n.</i>	Omi	Ván
Fish, <i>v.</i>	Ongorumátá	
Fish, <i>n.</i>	Ongo	Ngá
Fish-hook, <i>n.</i>	Okhú	
Flat, <i>a.</i>	Khidi	Todé
Flint, <i>n.</i>	Olúng	
Flower, <i>n.</i>	Thirá	Chongpo
Foot, <i>n.</i>	Ocho	Dá
Forest, <i>n.</i>	Otung	Ling
Forget, <i>v.</i>	Méchogáche	Ilako
Fowl, <i>n.</i>	Hono	Vo
Friend, <i>n.</i>	Akhamo	
Frog, <i>n.</i>	Oú	Lúk
Fruit, <i>n.</i>	Ethi	Ari
		Ching
Ginger, <i>n.</i>	Osang	
Girl, <i>n.</i>	Loroe	
Give, <i>v.</i>	Apiá	Láhé
Go, <i>v.</i>	Iá	Káo, Káláo
Goat, <i>n.</i>	Niania	Kiên
Good, <i>a.</i>	Mhoná	Asan
Grandfather, <i>n.</i>	Amétú	
Grandmother, <i>n.</i>	Aioro	
Grandson, <i>n.</i>	Arroo	
Granddaughter, <i>n.</i>	Arr	
Grass, <i>n.</i>	Ero	Hing
Grasshopper, <i>n.</i>	Khomo	Kúpehang
Grave, <i>n.</i>	Okhap	
Great, <i>a.</i>	Chepo	Adong
Great-toe, <i>n.</i>	Choiongpú	
Green (raw), <i>a.</i>	Esá	Ahing
Ground, <i>n.</i>	Loko	
Gullet, <i>n.</i>	Onatchang	
Gun, <i>n.</i>	Chingipú	Vantho
Gunpowder, <i>n.</i>	Khúr	
Guts, <i>n.</i>	Err	
		Kácho
Hair, <i>n.</i>	Ochá	
Half, <i>a.</i>	Meehanghá	

<i>English.</i>	<i>Lhotá Nágá.</i>	<i>Jaipúria Nágá.</i>
Hand, <i>n.</i>	Okhé	Dák
Hawk, <i>n.</i>	Mongshiro	Lá
Head, <i>n.</i>	Kori	Khó
Hear, <i>v.</i>	Engáche	Táto
Heart, <i>n.</i>	Mitháp	Mangto
Heavy, <i>a.</i>	Mingá	Ali
Heel, <i>n.</i>	Umpho	
Hen, <i>n.</i>	Honopvú	Vo
Here, <i>ad.</i>	Helo	Anang
Hill, <i>n.</i>	Phúnglá	Háchong
Hip, <i>n.</i>	Ophi	
Hoe, <i>n.</i>	Khotrang	Jánván
Hold, <i>v.</i>	Rimhátá	
Honey, <i>n.</i>	Chakichă	
Hoof, <i>n.</i>	Inkiep	Dások
Horn, <i>n.</i>	Etsă	Rong
Horse, <i>n.</i>	Qúrr	Mok
Hot, <i>a.</i>	Sosouá	Akhám
House, <i>n.</i>	Kiká	Húm
How much? <i>ad.</i>	Kútátá	
I, <i>pron.</i>	Akhá	
Iron, <i>n.</i>	Ionchák	Ján, or Zán.
Ivory, <i>n.</i>	Sotsoho	Púokpá
Jaw, <i>n.</i>	Khoká	
Jungle-fowl, <i>n.</i>	Ipiá	
Jungle, <i>n.</i>	Ora	
Keep, <i>v.</i>	Jetangána	Riémo
Kick, <i>v.</i>	Echiáchá	
Kid, <i>n.</i>	Niániároro	
Kill, <i>v.</i>	Sáhi	Rikváto
Kilt, <i>n.</i>	Serim	
Kind, <i>a.</i>	Záná	
King, <i>n.</i>	Etsă	
Knee, <i>n.</i>	Unkhok	Dákú
Knot, <i>n.</i>	Unsá	Asik
Knuckle, <i>n.</i>	Khemhiek	

<i>English.</i>	<i>Lhoiá Nágá.</i>	<i>Jaipúriá Nágá.</i>
Ladder, <i>n.</i>	Jengi	Hitho
Leaf, <i>n.</i>	Oio	Niáp
Leg, <i>n.</i>	Ochokhá	Dá
Lemon, <i>n.</i>	Chámbé	
Length, <i>n.</i>	Sibúá	
Leopard, <i>n.</i>	Morrh	Rúsá
Liek, <i>v.</i>	Miágákhá	Liepdáko
Lightning, <i>n.</i>	Chengchúá	Kiepdá
Lip, <i>n.</i>	Méhú	
Little, <i>a.</i>	Ichikarro	Achá
Liver, <i>n.</i>	Inthén	
Long, <i>a.</i>	Sibúá	Alo
Man, <i>n.</i>	Chón	Minian
Mangoe, <i>n.</i>	Chibingthi	
Meat, <i>n.</i>	Oso	
Medicine, <i>n.</i>	Moză	Pham
Milk, <i>n.</i>	Sirothú	Ngiúpo
Monkey, <i>n.</i>	Iákso	Vé
Month, <i>n.</i>	Choro	Dápé
Moon, <i>n.</i>	Choro	Dá
Mother, <i>n.</i>	Aio	
Mountain, <i>n.</i>	Phúnglang	Háho
Mouse, <i>n.</i>	Jiro	Júpú
Mouth, <i>n.</i>	Opang	Tun
Mud, <i>n.</i>	Emhá	
Moustaches, <i>n.</i>	Mhéham	
Nail (finger), <i>n.</i>	Inkiep	
Naked, <i>a.</i>	Phushă	
Navel, <i>n.</i>	Nákháni	
Near, <i>prep.</i>	Osibo	Thékro
Neck, <i>n.</i>	Engú	Bo
Needle, <i>n.</i>	Opiom	Matkú
Nephew, <i>n.</i>	Ango	
Nest, <i>n.</i>	Woroshep	Arúp
Net, <i>n.</i>	Ochák	Chak
New, <i>a.</i>	Ethán	Anián
Night, <i>n.</i>	Mengákhá	Ránpán
Nine, <i>a.</i>	Toku	Ikhú
Nineteen, <i>a.</i>	Mechu-me-tokú	Ichi-van-ikhú

<i>English.</i>	<i>Lhotá Nágá.</i>	<i>Jaipúriá Nágá.</i>
Ninety, <i>a.</i>	Ekha-toku	Rúák-ikhú
No, <i>ad.</i>	Ni	Má
Nose, <i>n.</i>	Khéno	Kho
Now, <i>ad.</i>	Nhángá	Doko.
Oil, <i>n.</i>	Penchang	Tánthi
Old, <i>a.</i>	Eke	Ato
Onion, <i>n.</i>	Sánráng	
Orange, <i>n.</i>	Kongkeng	Múthúlá
Orphan, <i>n.</i>	Ipúti	
Owl, <i>n.</i>	Velongú	Vákhú
Peacock, <i>n.</i>	Titákhá	Soijang
Pig, <i>n.</i>	Kashag	Vák
Pigeon, <i>n.</i>	Vehá	Pári
Plantain, <i>n.</i>	Vothitong	Kiéké
Poison, <i>n.</i>	Mozz	
Poor, <i>a.</i>	Yanché	
Porcupine, <i>n.</i>	Liso	Vikhá
Potato, <i>n.</i>	Horokhá	
Pull, <i>v.</i>	Sésia	Sieto
Push, <i>v.</i>	Núngchiache	Thúamo
Rafter, <i>n.</i>	Khiron	
Rain, <i>n.</i>	Erú	Ránpát
Rat, <i>n.</i>	Zuru	Júpú
Raw, <i>a.</i>	Esá	Ahing
Red, <i>a.</i>	Rágá	
Rest, <i>v.</i>	Esántáwá	
Return, <i>v.</i>	Elainlé	
Rib, <i>n.</i>	Khoiorú	
Rice (cooked), <i>n.</i>	Ochang	Vong
Rice (uncooked), <i>n.</i>	Ochok	
Rich, <i>a.</i>	Eli	
Ring, <i>n.</i>	Yonpenro,	Khap
Ripe, <i>n.</i>	Emhá	Achúm
River, <i>n.</i>	Zúkhu	Joán
Road, <i>n.</i>	Oláng	Lam
Root, <i>n.</i>	Chingien	Aring
Rotten, <i>a.</i>	Echion	Asán
Rupee, <i>n.</i>	Oráng	Ráñká



<i>English.</i>	<i>Lhotá Nágá.</i>	<i>Jaipuriá Nágá.</i>
Salt, <i>n.</i>	Omá	Sún
Same, <i>a.</i>	Eniká	
Sand, <i>n.</i>	Háchang	Sé
Sap, <i>n.</i>	Chingcha	
Say, <i>v.</i>	Phúá	Thú
Scratch, <i>v.</i>	Nakia	
See, <i>v.</i>	Zetache	
Seige, <i>v.</i>	Rémhátá	
Seven, <i>a.</i>	Ching	Ingit
Seventy, <i>a.</i>	Ekha-ching	Rúák-ingit
Seventeen, <i>a.</i>	Mechu-me-ching	Ichi-van-ingit
Shade, <i>n.</i>	Khámcho	Rangbin
Shame, <i>n.</i>	Eiágrá	Réséo
Share, <i>v.</i>	Chitává	
Sharpen, <i>v.</i>	Mhonérúá	
Shave, <i>v.</i>	Koritsá	
Shield, <i>n.</i>	Ochung	Lák
Short, <i>a.</i>	Engháro	Atón
Shoulder, <i>n.</i>	Epúká	Chúákho
Shut, <i>v.</i>	Eléngkhokhé	Sako
Sick, <i>a.</i>	Perthátá	Achat
Silver, <i>n.</i>	Orang	Ngún
Sister, <i>n.</i>	Ailoi	Ingiá
Sister-in-law, <i>n.</i>	Oázio	
Sit, <i>v.</i>	Khúthéthá	Tángo
Six, <i>a.</i>	Chúro	Irok
Sixteen, <i>a.</i>	Mechu-me-chúro	Ichi-van-irok
Sixty, <i>a.</i>	Rogro	Rúák-irok
Skin, <i>n.</i>	Ohú	
Sleep, <i>v.</i>	Ipánáché	Júpo
Slowly, <i>ad.</i>	Chimá-chimá	Aréré
Sly, <i>a.</i>	Okiéllá	
Small, <i>a.</i>	Tiro	Aring
Snake, <i>n.</i>	Inrá	Pú
So, <i>ad.</i>	Hetoloini	
Son, <i>n.</i>	Choi	
Sow, <i>n.</i>	Wokokú	Váno
Span, <i>n.</i>	Ekúá	
Spear, <i>n.</i>	Otho	Pá
Stab, <i>v.</i>	Echúngá	Súo
Star, <i>n.</i>	Santio	Merik

<i>English.</i>	<i>Lhotá Nágá.</i>	<i>Jaipúriá Nágá.</i>
Steal, <i>v.</i>	Evanéá	Húo
Stick, <i>n.</i>	Karung	
Stone, <i>n.</i>	Alonkhá	Long
Stomach, <i>n.</i>	Opok	Vok
Straight, <i>a.</i>	Unsa	Ating
Stream, <i>n.</i>	Zúkhúro	
Strength, <i>n.</i>	Epúichúngá	Achán
Sun, <i>n.</i>	Eng	Sán
Swear, <i>v.</i>	Echámáhi	
Sweet, <i>a.</i>	Nangá	Atú
Tail, <i>n.</i>	Embi	Amé
Take, <i>v.</i>	Khialo	Kápo
Tall, <i>a.</i>	Sibúá	
Ten, <i>a.</i>	Tero	Ichi
Then, <i>ad.</i>	Kothingla	
There, <i>ad.</i>	Chikhe	
Thick, <i>a.</i>	Chiá	
Thief, <i>n.</i>	Evúi	Ahú
Thin, <i>a.</i>	Epúá	
This, <i>pron.</i>	Hiché	
Thirty, <i>a.</i>	Thúnro	Rúák-ram
Thorn, <i>n.</i>	Okio	Sú
Thousand, <i>a.</i>	Unzotaro	Chá-ichi
Three, <i>a.</i>	Etham	Vánram
Throw, <i>v.</i>	Sia	Páto
Thunder, <i>n.</i>	Echénékhá	Rángmok
To-day, <i>ad.</i>	Inching	Tajā
Toe, <i>n.</i>	Choiongro	Dáshu
To-morrow, <i>ad.</i>	Ochú	Ni-nap
Tongue, <i>n.</i>	Enni	Tháli
Tooth, <i>n.</i>	Oho	Pá
Tree, <i>n.</i>	Otong	Báng
Truth, <i>n.</i>	Otchocho	
Twelve, <i>a.</i>	Tero-seni	Ichi-váni
Twenty, <i>a.</i>	Mekú	Rúák-ni
Two, <i>a.</i>	Enni	Váni
Vegetable, <i>n.</i>	Ohán	
Village, <i>n.</i>	Oiyá	Há
Water, <i>n.</i>	Otchá	Jo

<i>English.</i>	<i>Lhotá Nágá.</i>	<i>Jaipuriá Nágá.</i>
Wax, <i>n.</i>	Oekhá	Niáso
Wet, <i>v.</i>	Uncha	
When, <i>ad.</i>	Kothonga	
Where, <i>ad.</i>	Koiá	Mákoá
Which, <i>pro.</i>	Chokúto	Mápá
White, <i>a.</i>	Miá	Apo
Who? <i>pron.</i>	Chúá	Háná
Wide, <i>a.</i>	Choákk	
Widow, <i>n.</i>	Emi	Jántengiú
Widower, <i>n.</i>	Khiangrán	Jántéva
Wife, <i>n.</i>	Ang	Jáungiú
Within, <i>prep.</i>	Táchungi	
Woman, <i>n.</i>	Eloi	Déhiék
Wood, <i>n.</i>	Otóng	Pan
Wrist, <i>n.</i>	Khemhiék	
<hr/>		
Yam, <i>n.</i>	Máni	Hakhúon
Year, <i>n.</i>	Enzúkhá	Ránpá
Yes, <i>ad.</i>	Hokhá	

On the Sulvasútras.—By DR. G. THIBAUT, *Anglo-Sanskrit Professor,*
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It is well known that not only Indian life with all its social and political institutions has been at all times under the mighty sway of religion, but that we are also led back to religious belief and worship when we try to account for the origin of research in those departments of knowledge which the Indians have cultivated with such remarkable success. At first sight, few traces of this origin may be visible in the S'ástras of later times, but looking closer we may always discern the connecting thread. The want of some norm by which to fix the right time for the sacrifices, gave the first impulse to astronomical observations; urged by this want, the priests remained watching night after night the advance of the moon through the circle of the nakshatras and day after day the alternate progress of the sun towards the north and the south. The laws of phonetics were investigated, because the wrath of the gods followed the wrong pronunciation of a single letter of the sacrificial formulas; grammar and etymology had the task of securing the right understanding of the holy texts. The close connexion of philosophy and theology—so close that it is often impossible to decide

where the one ends and the other begins—is too well known to require any comment.

These facts have a double interest. They are in the first place valuable for the history of the human mind in general; they are in the second place important for the mental history of India and for answering the question relative to the originality of Indian science. For whatever is closely connected with the ancient Indian religion must be considered as having sprung up among the Indians themselves, unless positive evidence of the strongest kind point to a contrary conclusion.

We have been long acquainted with the progress which the Indians made in later times in arithmetic, algebra, and geometry; but as the influence of Greek science is clearly traceable in the development of their astronomy, and as their treatises on algebra, &c., form but parts of astronomical text books, it is possible that the Indians may have received from the Greeks also communications regarding the methods of calculation. I merely say possible, because no direct evidence of such influence has been brought forward as yet, and because the general impression we receive from a comparison of the methods employed by Greeks and Indians respectively seems rather to point to an entirely independent growth of this branch of Indian science. The whole question is still unsettled, and new researches are required before we can arrive at a final decision.

While therefore unable positively to assert that the treasure of mathematical knowledge contained in the *Lilāvati*, the *Vijaganita*, and similar treatises, has been accumulated by the Indians without the aid of foreign nations, we must search whether there are not any traces left pointing to a purely Indian origin of these sciences. And such traces we find in a class of writings, commonly called *S'ulvas'utras*, that means "s'utras of the cord," which prove that the earliest geometrical and mathematical investigations among the Indians arose from certain requirements of their sacrifices. "*S'ulvas'utras*" is the name given to those portions or supplements of the *Kalpas'utras*, which treat of the measurement and construction of the different vedis, or altars, the word "*s'ulva*" referring to the cords which were employed for those measurements. (I may remark at once that the s'utras themselves do not make use of the term "*s'ulva*"; a cord is regularly called by them "*rajju*".) It appears that a *s'ulva-adhyaya* or, *pras'na* or, instead of that, a *s'ulvaparis'ishta* belonged to all *Kalpas'utras*. Among the treatises belonging to this class which are known to me, the two most important are the *S'ulvas'utras* of *Baudhāyana* and of *A'pastamba*. The former, entitled to the first place by a clearer and more extensive treatment of the topics in question, very likely forms a part of *Baudhāyana's* *Kalpas'utra*; the want of complete manuscripts of this latter work prevents me from being positive on this point. The same remark applies to the *S'ulvas'utra* of *A'pastamba*.

Two smaller treatises, a Mánava S'ulvasūtra and a Maitráyanīya S'ulvasūtra, bear the stamp of a later time, compared with the works of Baudháyana and A'pastamba. The literature of the white Yajur Veda possesses a S'ulvapariśiṣṭa, ascribed to Kátyáyana, and there is no sufficient reason for doubting that it was really composed by the author of the Kalpasūtra.

The first to direct attention to the importance of the S'ulvasūtras was Mr. A. C. Burnell, who in his "Catalogue of a Collection of Sanscrit Manuscripts," p. 29, remarks that "we must look to the S'ulva portions of the Kalpasūtras for the earliest beginnings of geometry among the Bráhmans."

I have begun the publication of Baudháyana's S'ulvasūtra, with the commentary by Dvárakanáthayajvan and a translation, in the May number of the "Paṇḍit, a monthly Journal of the Benares College, etc.", and intend as soon as I have finished Baudháyana, to publish all other ancient S'ulva works of which I shall be able to procure sufficiently correct manuscripts. In the following pages I shall extract and fully explain the most important sūtras, always combining the rules given in the three most important s'ulva treatises, those of Baudháyana, A'pastamba, and Kátyáyana, and so try to exhibit in some systematic order the knowledge embodied in these ancient sacrificial tracts.

The sūtras begin with general rules for measuring; the greater part of these rules, in which the chief interest of this class of writings is concentrated, will be given further on. In the next place they teach how to fix the right places for the sacred fires, and how to measure out the vedis of the different sacrifices, the saumikí vedi, the paitrikí vedi, and so on.

The remainder of the sūtras contains the detailed description of the construction of the "agni", the large altar built of bricks, which was required at the great soma sacrifices.

This altar could be constructed in different shapes, the earliest enumeration of which we find in the Taittiríya Samhitá, V. 4. 11.

Following this enumeration Baudháyana and A'pastamba furnish us with full particulars about the shape of all these different chitis and the bricks which had to be employed for their construction. The most ancient and primitive form is the chaturasras'yenachit, so called because it rudely imitates the form of a falcon, and because the bricks out of which it is composed are all of a square shape. It had to be employed whenever there was no special reason for preferring another shape of the agni; and all rules given by bráhmanas and sūtras for the agnichayana refer to it in first line. A full description of the construction of this agni according to the ritual of the white Yajur Veda and of all accompanying ceremonies has been given by Professor A. Weber in the 13th volume of the "Indische Studien." A nearer approach to the real shape of a falcon or—as the

sūtras have it—of the shadow of a falcon about to take wing is made in the s'yena vakrapaksha vyastapuchchha, the falcon with curved wings and outspread tail.* The kañkachit, the agni constructed in the form of a heron, or according to Burnell (Catalogue, p. 29) of a carrion-kite, is but a slight variation of the s'yenachiti; it is distinguished from it by the addition of the two feet. The alajachit again is very little different from the kañkachit, showing only a slight variation in the outline of the wings. What particular bird was denoted by the word alaja, the commentators are unable to inform us; in the commentary to Taittir. Samh. V. 5. 20 it is explained as "bhāsa", which does not advance us very much, as the meaning of bhāsa itself is doubtful. Next comes the praūgachit, the construction imitating the form of the praūga, the forepart of the poles of a chariot, an equilateral acutangular triangle and the ubhayatah-praūgachit made out of two such triangles joined with their bases. Then follows the rathachakrachit, the altar constructed in the form of a wheel; in the first place the simple rathachakrachit, a massive wheel without spokes, and secondly, the more elaborate sārathachakrachit, representing a wheel with sixteen spokes. The dropachit represents a dropa, a particular kind of tub or vessel; it could be constructed in two shapes, either square or circular (chaturasradropachit and parimaṇḍala-dropachit). The parichāyyachit, which is mentioned in the next place, is in its circular outline equal to the rathachakrachit, but it differs from it in the arrangement of the bricks, which are to be placed in six concentric circles. The samūhyachit has likewise a circular shape; its characteristic feature was that loose earth was employed for its construction instead of the bricks. Of the s'masānachit a full description together with the necessary diagrams will be given further on. The last chiti mentioned is the kúrmachit, the altar representing a tortoise; the tortoise may be either vakránga, of an angular shape, or parimaṇḍala, circular.

Every one of these altars had to be constructed out of five layers of bricks, which reached together to the height of the knee; for some cases ten or fifteen layers and a correspondingly increased height of the altar were prescribed. Every layer in its turn was to consist of two hundred bricks, so that the whole agni contained a thousand; the first, third, and fifth layers were divided into two hundred parts in exactly the same manner; a different division was adopted for the second and the fourth, so that one brick was never lying upon another brick of the same size and form.

Regarding the reasons which may have induced the ancient Indians to devise all these strange shapes, the Samhitās and Bráhmaṇas give us

* The plates accompanying this paper contain the diagrams of three different chitis; diagrams of all the remaining chitis will be given in the 'Paṇḍit' in the proper places.

but little information. Thus we read for instance in the Taittirīya Samhitá :

S'yenachitam chinvíta suvargakámah, s'yeno vai vayasám patishthah, s'yena eva bhútvá suvargam lokam patati.

"He who desires heaven, may construct the falcon-shaped altar ; for the falcon is the best flyer among the birds ; thus he (the sacrificer) having become a falcon himself flies up to the heavenly world."

In the same place the dropachiti is brought into connexion with the acquiring of food ; the praūga and rathachakra are described as thunderbolts which the sacrificer hurls on his enemies, and so on. Here as in many other cases we may doubt if the symbolical meaning which the authors of the bráhmaṇas find in the sacrificial requisites and ceremonies is the right one ; still we cannot propose anything more satisfactory.

But the chief interest of the matter does not lie in the superstitious fancies in which the wish of varying the shape of the altars may have originated, but in the geometrical operations without which these variations could not be accomplished. The old yajnikas had fixed for the most primitive chiti, the chaturasras'yenachit, an area of seven and a half square purushas, that means seven and a half squares, the side of which was equal to a purusha, *i. e.*, the height of a man with uplifted arms. This rule was valid at least for the case of the agni being constructed for the first time ; on each subsequent occasion the area had to be increased by one square purusha.

Looking at the sketch of the chaturas'ra s'yena we easily understand why just $7\frac{1}{2}$ square purushas were set down for the agni. Four of them combined into a large square form the átman, or body of the bird, three are required for the two wings and the tail, and lastly, in order that the image might be a closer approach to the real shape of a bird, wings and tail were lengthened, the former by one fifth of a purusha each, the latter by one tenth. The usual expression used in the sūtras to denote the agni of this area is "agnih saptavidhah sáratniprádes'ah, the sevenfold agni with aratni and prádes'a," the aratni being the fifth (= 24 aṅgulis), and the prádes'a, the tenth of a purusha (= 12 aṅgulis).

Now when for the attainment of some special purpose, one of the variations enumerated above was adopted instead of the primitive shape of the agni, the rules regulating the size of the altar did not cease to be valid, but the area of every chiti whatever its shape might be—falcon with curved wings, wheel, praūga, tortoise, etc.—had to be equal to $7\frac{1}{2}$ square purushas. On the other hand, when at the second construction of the altar one square purusha had to be added to the seven and a half constituting the first chiti, and when for the third construction two square purushas more were required the shape of the whole, the relative proportions of the single

parts had to remain unchanged. A look at the outlines of the different chitis is sufficient to show that all this could not be accomplished without a certain amount of geometrical knowledge. Squares had to be found which would be equal to two or more given squares, or equal to the difference of two given squares; oblongs had to be turned into squares and squares into oblongs; triangles had to be constructed equal to given squares or oblongs, and so on. The last task and not the least was that of finding a circle, the area of which might equal as closely as possible that of a given square.

Nor were all these problems suggested only by the substitution of the more complicated forms of the agni for the primitive chaturasras'yena, although this operation doubtless called for the greatest exertion of ingenuity; the solution of some of them was required for the simplest sacrificial constructions. Whenever a figure with right angles, square or oblong, had to be drawn on the ground, care had to be taken that the sides really stood at right angles on each other; for would the āhavanīya fire have carried up the offerings of the sacrificer to the gods if its hearth had not the shape of a perfect square? There was an ancient precept that the vedi at the sautrāmanī sacrifice was to be the third part of the vedi at the soma sacrifices, and the vedi at the pitṛiyajna its ninth part; consequently a method had to be found out by which it was possible to get the exact third and ninth part of a given figure. And when, according to the opinion of some theologians, the gārhapatya had to be constructed in a square shape, according to the opinion of others as a circle, the difference of the opinions referred only to the shape, not to the size, and consequently there arose the want of a rule for turning a square into a circle.

The results of the endeavours of the priests to accomplish tasks of this nature are contained in the paribhāshā sūtras of the Śulvasūtras. The most important among these is, to use our terms, that referring to the hypotenuse of the rectangular triangle. The geometrical proposition, the discovery of which the Greeks ascribed to Pythagoras, was known to the old āchāryas, in its essence at least. They express it, it is true, in words very different from those familiar to us; but we must remember that they were interested in geometrical truths only as far as they were of practical use, and that they accordingly gave to them the most practical expression. What they wanted was, in the first place, a rule enabling them to draw a square of double the size of another square, and in the second place a rule teaching how to draw a square equal to any two given squares, and according to that want they worded their knowledge. The result is, that we have two propositions instead of one, and that these propositions speak of squares and oblongs instead of the rectangular triangle.

These propositions are as follows :

Baudhāyana :

समचतुरस्रस्याहणयारज्जुर्दिशावतीं भूमिं करोति ।

The cord which is stretched across—in the diagonal of—a square produces an area of double the size.

That is : the square of the diagonal of a square is twice as large as that square.

Āpastamba :

चतुरस्रस्याहणयारज्जुर्दिशावतीं भूमिं करोति ।

Kātyāyana :

समचतुरस्रस्याहणयारज्जुर्द्विकरणी ।

The cord in the diagonal of a square is the cord (the line) producing the double (area).

"Samachaturasra" is the term employed throughout in the *S'ulvasūtras* to denote a square, the "sama" referring to the equal length of the four sides and the chaturasra implying that the four angles are right angles. The more accurate terminology of later Indian geometry distinguishes two classes of samachaturas'ras, or samachaturbhuja, viz. the samakarna samachaturbhuja and the vishamakarna samachaturbhuja ; the *S'ulvasūtras*, having to do only with the former one, make no such distinction. Akshapayārāju is the ancient term, representing the later "karnarāju" or simply "karna." "Area" is here denoted by "bhūmi," while in later times "kshetra" expressed this idea, and "bhūmi" became one of the words for the base of a triangle or any other plane figure.

The side of a square is said to produce that square (karoti), a way of speaking apparently founded on the observation that the square is found by multiplying the number which expresses the measure of the side by itself ; if the side was five feet long, the square was found to consist of 5×5 little squares, &c. The expression was not applicable to other plane figures, to an oblong for instance ; for there the area is the product of two sides of different length, neither of which can be said to produce the figure by itself.

The side of a square, or originally the cord forming the side of a square, is therefore called the "karani" of the square. That "rajju" is to be supplied to "karani", is explicitly stated by Kātyāyana :

करणी तत्करणी तिर्यङ्मानी पार्श्वमान्यहणयेति रज्जवः ।

By the expressions : karani, karani of that (of any square) &c., we mean cords.

The side of a square being called its karani, the side of a square of double the size was the "dvikarani", the line producing the double (I shall for convenience sake often employ the terms "side" or "line"

instead of "cord"); this was therefore the name for the diagonal of a square. Other compounds with *karani* will occur further on; the change of meaning which the word has undergone in later times will be considered at the end of this paper.

The authors of the *sūtras* do not give us any hint as to the way in which they found their proposition regarding the diagonal of a square; but we may suppose that they, too, were observant of the fact that the square on the diagonal is divided by its own diagonals into four triangles, one of which is equal to half the first square. This is at the same time an immediately convincing proof of the Pythagorean proposition as far as squares or equilateral rectangular triangles are concerned.

The second proposition is the following :

Baudhāyana :

दीर्घचतुरस्रस्याक्षरज्जुः पार्श्वमानी तिर्यङ्मानी च यत्पृथग्भूते कुरुतस्तदुभयं करोति ।

The cord stretched in the diagonal of an oblong produces both (areas) which the cords forming the longer and the shorter side of an oblong produce separately.

That is : the square of the diagonal of an oblong is equal to the square of both its sides.

Āpastamba :

दीर्घस्याक्षरज्जुः पार्श्वमानी तिर्यङ्मानी च यत्पृथग्भूते कुरुतस्तदुभयं करोति ।

Kātyāyana gives the rule in the same words as Baudhāyana.

The remark made about the term *samachaturasra* applies also to "dīrghachaturasra" "the long quadrangle" meaning the long quadrangle with four right angles. "Pārs'vamāni (rajju)" is the cord measuring the pārs'va or the long side of the oblong or simply this side itself; *tiryamāni*, the cord measuring the horizontal extent or the breadth of the oblong, in other words its shorter side, which stands at right angles to the longer side. Noteworthy is the expression "prithagbhūte;" for as one of the commentators observes it is meant as a caution against taking the square of the sum of the two sides instead of the sum of their squares (*prithag-grahanam samsargo mā bhūd ity evamartham*).

It is apparent that these two propositions about the diagonal of a square and an oblong, when taken together, express the same thing that is enunciated in the proposition of Pythagoras.

But how did the *sūtrakāras* satisfy themselves of the general truth of their second proposition regarding the diagonal of rectangular oblongs?

Here there was no such simple diagram as that which demonstrates the truth of the proposition regarding the diagonal of a square, and other means of proof had to be devised.

Baudhāyana :

चिकचतुष्कयोर्द्वादशिकपश्चिकयोः पञ्चदशिकाष्टिकयोः सप्तिकचतुर्विंशिकयोर्द्वादशिकपञ्चविंशिकयोः पञ्चदशिकपट्विंशिकयोरित्येतास्तत्पञ्चभिः ।

This (*viz.* that the diagonal of an oblong produces by itself, &c.,) is seen in those oblongs the sides of which are three and four, twelve and five, fifteen and eight, seven and twenty-four, twelve and thirty-five, fifteen and thirty-six (literally, the sides of which consist of three parts and four parts, &c.)

This sūtra contains the enumeration of, as we should say, five Pythagorean triangles, *i. e.*, rectangular triangles, the three sides of which can be expressed in integral numbers. (Baudhāyana enumerates six ; but the last is essentially the same with the second, 15 and 36 being 3×5 and 3×12 .) Baudhāyana does not give the numbers expressing the length of the diagonals of his oblongs or the hypotenuses of the rectangular triangles, and I subjoin therefore some rules from A'pastamba, which supply this want, while they show at the same time the practical use, to which the knowledge embodied in Baudhāyana's sūtra could be turned.

The vedi or altar employed in the soma sacrifices was to have the dimensions specified in the following :

त्रिंशत्पदानि प्रक्रमा वा पश्चान्तिरक्षी भवति पट्विंशत् प्राची चतुर्विंशतिः पुरस्तात्तिरक्षीति सौमिक्या वेदेर्विज्ञायते ।

The western side is thirty padas or prakramas long, the prāchī or east line (*i. e.*, the line drawn from the middle of the western side to the middle of the eastern side of the vedi) is thirty-six padas or prakramas long ; the eastern side twenty-four ; this is the tradition for the vedi at the soma sacrifices.

Now follow the rules for the measurement of the area of this vedi :

पट्विंशिकायामेष्टादशोपसमस्यापरस्मादन्नाद् द्वादशसु लक्षणं पञ्चदशसु लक्षणं षष्ठान्त्योरन्तौ नियम्य पञ्चदशिकेन दक्षिणापायस्य शङ्कुं निहत्येवमुत्तरतस्तौ शेषौ विपर्यस्यांस्तौ पञ्चदशिकेनैवापायस्य द्वादशिकं शङ्कुं निहत्येवमुत्तरतस्तावत्सौ तदेकरज्ज्वा विहरणम् ।

Add to the length of thirty-six (*i. e.*, to a cord of the length of thirty-six either padas or prakramas) eighteen (the whole length of the cord is then 54), and make two marks on the cord, one at twelve, the other at fifteen, beginning from the western end ; tie the ends of the cord to the ends of the prishthya line (the prishthya is the same as the prāchī, the line directed exactly towards the east and west points, and going through the centre of the vedi. The fixing of the prāchī was the first thing to be done when any altar had to be measured out. The methods devised for this end will not be discussed here, as they are based on astronomical observations ; for our purpose it is sufficient to know that a line of 36 padas length

and running from the east towards the west had been drawn on the ground. On both ends of this line a pole was fixed and the ends of the cord of 54 padas length tied to these poles) and taking it by the sign at fifteen, draw it towards the south; (at the place reached by the mark, after the cord has been well stretched) fix a pole. Do the same on the northern side (*i. e.*, draw the cord towards the north as you have drawn it just now towards the south). By this process the two *s'ronis*, the southwest corner and the southeast corner of the *vedi* are fixed. After that exchange (the ends of the cord; *i. e.*, tie that end which had been fastened at the pole on the east end of the *práchi* to the pole on its west end and *vice versa*), and fix the two *ampsas* ("shoulders" of the *vedi*, *i. e.*, the southeast corner and the northeast corner). This is done by stretching the cord towards the south having taken it by the mark at fifteen and by fixing a pole on the spot reached by the mark at twelve; and by repeating the same operation on the northern side. The result are the two *ampsas*. This is the measurement of the *vedi* by means of one cord (the measurements described further on require two cords each). (See diagram 1.)

The whole process described in the preceding is founded on the knowledge that a triangle, the three sides of which are equal to 15, 36, 39, is rectangular.

The end aimed at was to draw the east and the west side of the *vedi* at right angles on the *práchi*. Accordingly, the *práchi* *a b* being 36 feet long, a cord *a c b* ($= 54$) was divided by a mark into two parts $a c = 39$ and $b c = 15$ and fastened at *a* and *b*. If then this cord was taken at *c*, and stretched towards the right, the angle *a b c* could not but be a right angle. The same applies to the angles *a b d*, *b a e*, and *b a f*. In fixing the two east corners, both marks on the cord had to be employed, the mark at fifteen being used for constructing the right angle, the mark at 12 giving to the east side of the *vedi* the prescribed length (24 padas).

त्रिकचतुष्कयोः पश्चिकाक्षयारज्जुः ।

The diagonal cord of an oblong, the side cords of which are three and four, is five.

ताभिस्त्रिरभ्यस्ताभिरञ्ज्ये ।

With these cords increased three times (by itself; *i. e.*, multiplied by four) the two eastern corners of the *vedi* are fixed.

The proceeding is as follows: (See diagram 2.)

At *c*, at a distance of 16 padas from *a*, the east end of the *práchi*, a pole is fixed and then a cord of 32 feet length tied to the poles at *a* and *c*. The cord is marked at a distance of 12 padas from *a*, and then taken by the mark and drawn towards the south until it reaches the position *a e c*. Thus

a triangle is formed, the sides of which are 12, 16, 20 and this triangle is a rectangular one; a e stands at right angles on a c, and as it is just 12 padas long, e marks the place of the southeast corner of the vedi. The north east corner d is found in the same way.

चतुरभ्यस्तामिः श्रेणी ।

With the same cords increased four times (*i. e.*, their length multiplied by five) the two western corners of the vedi are found.

In this case a cord of 40 padas length is tied to the poles at c and b, and marked at the distance of 15 padas from b. Then it is taken by the mark and drawn towards the south into the position b g c. The result is a rectangular triangle as above; g marks the place of the southwest corner. The same operation repeated on the north side gives f as the place of the northwest corner of the vedi.

Another method for the measurement of the vedi follows :

द्वादशिकपञ्चिकयोस्तयोदशिकाक्षयारज्जुस्तामिरुसौ ।

The diagonal cord of an oblong, the sides of which are twelve and five, is thirteen; with these cords the two east corners are fixed.

(See diagram III.)

A pole is fixed at the distance of five padas from the east end of the *prāchī*, a cord of twenty-five padas length fastened at a and c, marked at the distance of 12 padas from a, drawn towards the south &c., as above.

द्विरभ्यस्तामिः श्रेणी ।

With these cords increased twice (multiplied by three) the two western corners are fixed.

The requisite rectangular triangle is here formed by the whole *prāchī* = 36, and by a cord of 54, divided by a mark into two pieces of 15 and 39.

Another method follows :

पञ्चदशिकाष्टिकयोः सप्तदशिकाक्षयारज्जुस्तामिरुसौ ।

The diagonal cord of an oblong, the sides of which are fifteen and eight, is seventeen; with these cords the two western corners are fixed.

(See diagram 4.)

A pole b is fixed at the distance of eight padas from d, a cord of 32 padas tied to b and d, &c.

द्वादशिकपञ्चविंशिकयोः सप्तविंशिकाक्षयारज्जुस्तामिरुसौ ।

The diagonal cord of an oblong, the sides of which are twelve and thirty-five is thirty-seven; with these cords the two eastern corners are fixed.

A pole is fixed at c, thirty-five padas to the west from a; a cord of forty-nine padas tied to a and c, &c.

एतावन्ति विज्ञेयानि वेदिविहरणानि भवन्ति ।

So many "cognizable" measurements of the vedi exist.

That means : these are the measurements of the vedi effected by oblongs, of which the sides and the diagonal can be known, *i. e.*, can be expressed in integral numbers.

In this manner A'pastamba turns the Pythagorean triangles known to him to practical use (the fourth of those which Baudhāyana enumerates is not mentioned, very likely because it was not quite convenient for the measurement of the vedi), but after all Baudhāyana's way of mentioning these triangles as proving his proposition about the diagonal of an oblong is more judicious. It was no practical want which could have given the impulse to such a research—for right angles could be drawn as soon as one of the "vijneya" oblongs (for instance that of 3, 4, 5) was known—but the want of some proof which might establish a firm conviction of the truth of the proposition.

The way in which the Śūtrakāras found the cases enumerated above, must of course be imagined as a very primitive one. Nothing in the śūtras would justify the assumption that they were expert in long calculations. Most likely they discovered that the square on the diagonal of an oblong, the sides of which were equal to three and four, could be divided into twenty-five small squares, sixteen of which composed the square on the longer side of the oblong, and nine of which formed the area of the square on the shorter side. Or, if we suppose a more convenient mode of trying, they might have found that twenty-five pebbles or seeds, which could be arranged in one square, could likewise be arranged in two squares of sixteen and of nine. Going on in that way they would form larger squares, always trying if the pebbles forming one of these squares could not as well be arranged in two smaller squares. So they would form a square of 36, of 49, of 64, &c. Arriving at the square formed by $13 \times 13 = 169$ pebbles, they would find that 169 pebbles could be formed in two squares, one of 144 the other of 25. Further on 625 pebbles could again be arranged in two squares of 576 and 49, and so on. The whole thing required only time and patience, and after all the number of cases which they found is only a small one.

Having found that, in certain cases at least, it was possible to express the sides and the diagonal of an oblong in numbers, the Śūtrakāras naturally asked themselves if it would not be possible to do the same thing for a square. As the side and the diagonal of a square are in reality incommensurable quantities we can of course only expect an approximative value ; but their approximation is a remarkably close one.

Baudhāyana :

प्रमाणं तृतीयेन वर्धयेत्तच्च चतुर्थेनात्मचतुर्लिङ्गेनानेन । सविशेषः ।

Increase the measure by its third part and this third by its own fourth less the thirty-fourth part of that fourth; (the name of this increased measure) is *savis'esha*.

Āpastamba gives the rule in the same words.

Kātyāyana :

करणी द्वितीयेन वर्धयेत्तच्च स्वचतुर्थेनात्मचतुस्त्रिंशेनेन सविशेष इति विशेषः।

The *sūtras* themselves are of an enigmatical shortness, and do not state at all what they mean by this increasing of the measure; but the commentaries leave no doubt about the real meaning; the measure is the *karani*, the side of a square and the increased measure the diagonal, the *dvikarani*. If we take 1 for the measure, and increase it as directed, we get the following expression : $1 + \frac{1}{3} + \frac{1}{3 \times 4} - \frac{1}{3 \times 4 \times 34}$ and this turned into a decimal fraction gives : 1.4142156 Now the side of a square being put equal to 1, the diagonal is equal to $\sqrt{2} = 1.414213...$ Comparing this with the value of the *savis'esha* we cannot fail to be struck by the accuracy of the latter.

The question arises : how did Baudhāyana or Āpastamba or whoever may have the merit of the first investigation, find this value? Certainly they were not able to extract the square root of 2 to six places of decimals; if they had been able to do so, they would have arrived at a still greater degree of accuracy. I suppose that they arrived at their result by the following method which accounts for the exact degree of accuracy they reached.

Endeavouring to discover a square the side and diagonal of which might be expressed in integral numbers they began by assuming two as the measure of a square's side. Squaring two and doubling the result they got the square of the diagonal, in this case = eight. Then they tried to arrange eight, let us say again, eight pebbles, in a square; as we should say, they tried to extract the square root of eight. Being unsuccessful in this attempt, they tried the next number, taking three for the side of a square; but eighteen yielded a square root no more than eight had done. They proceeded in consequence to four, five, &c. Undoubtedly they arrived soon at the conclusion that they would never find exactly what they wanted, and had to be contented with an approximation. The object was now to single out a case in which the number expressing the square of the diagonal approached as closely as possible to a real square number. I subjoin a list, in which the numbers in the first column express the side of the squares which they subsequently tried, those in the second column the square of the diagonal, those in the third the nearest square number.

1.	2.	1.	11.	242.	256.
2.	8.	9.	12.	288.	289.
3.	18.	16.	13.	338.	324.
4.	32.	36.	14.	392.	400.
5.	50.	49.	15.	450.	441.
6.	72.	64.	16.	512.	529.
7.	98.	100.	17.	578.	576.
8.	128.	121.	18.	648.	625.
9.	162.	169.	19.	722.	729.
10.	200.	196.	20.	800.	784.

How far the *Sūtrakāras* went in their experiments we are of course unable to say; the list up to twenty suffices for our purposes. Three cases occur in which the number expressing the square of the diagonal of a square differs only by one from a square-number; 8 — 9; 50 — 49; 288 — 289; the last case being the most favourable, as it involves the largest numbers. The diagonal of a square, the side of which was equal to twelve, was very little shorter than seventeen ($\sqrt{289} = 17$). Would it then not be possible to reduce 17 in such a way as to render the square of the reduced number equal or almost equal to 288?

Suppose they drew a square the side of which was 17 padas long, and divided it into $17 \times 17 = 289$ small squares. If the side of the square could now be shortened by so much, that its area would contain not 289, but only 288 such small squares, then the measure of the side would be the exact measure of the diagonal of the square, the side of which is equal to 12 ($12^2 + 12^2 = 288$). When the side of the square is shortened a little, the consequence is that from two sides of the square a stripe is cut off; therefore a piece of that length had to be cut off from the side that the area of the two stripes would be equal to one of the 289 small squares. Now, as the square is composed of 17×17 squares, one of the two stripes cuts off a part of 17 small squares and the other likewise of 17, both together of 34 and since these 34 cut-off pieces are to be equal to one of the squares, the length of the piece to be cut off from the side is fixed thereby: it must be the thirty-fourth part of the side of one of the 289 small squares.

The thirty-fourth part of thirty-four small squares being cut off, one whole small square would be cut off and the area of the large square reduced exactly to 288 small squares; if it were not for one unavoidable circumstance. The two stripes which are cut off from two sides of the square, let us say the east side and the south side, intersect or overlap each other in the south-east corner and the consequence is, that from the small square in that corner not $\frac{2}{34}$ are cut off, but only $\frac{2}{34} - \frac{1}{34 \times 34}$. Thence the

error in the determination of the value of the *savis'esha*. When the side of a square was reduced from 17 to $16 \frac{33}{34}$ the area of the square of that reduced side was not 288, but $288 + \frac{1}{34 + 34}$. Or putting it in a different way: taking 12 for the side of a square, dividing each of the 12 parts into 34 parts (altogether 408) and dividing the square into the corresponding small squares, we get $408 \times 408 = 166464$. This doubled is 332928. Then taking the *savis'esha*-value of $16 \frac{33}{34}$ for the diagonal and dividing the square of the diagonal into the small squares just described, we get $577 \times 577 = 332929$ such small squares. The difference is slight enough.

The relation of $16 \frac{33}{34}$ to 12 was finally generalized into the rule: increase a measure by its third, this third by its own fourth less the thirty-fourth part of this fourth $\left(16 \frac{33}{34} = 12 + \frac{12}{3} + \frac{12}{3 \times 4} - \frac{12}{3 \times 4 \times 34} \right)$

The example of the *savis'esha* given by commentators is indeed $16 \frac{33}{34} : 12$; the case recommended itself by being the first in which the third part of a number and the fourth part of the third part were both whole numbers.

Regarding the practical use of the *savis'esha*, there is in *Baudháyana* or rather, as far as I am able to see, in all *s'ulvasūtras* only one operation, for which it was absolutely necessary; this is, as we shall see later, the turning of a circle into a square, when the intention was to connect the rule for this operation with the rule for turning a square into a circle. *A'pastamba* employs (see further on) the *savis'esha* for the construction of right angles, but there were better methods for that purpose. The commentators indeed make the most extended use of the *savis'esha*, calculating by means of it the diagonals wherever diagonals come into question; this proceeding, however, is not only useless, but positively wrong, as in all such cases calculation cannot vie in accuracy with geometrical construction.

At the commencement of his *sūtras*, *Baudháyana* defining the measures he is going to employ, divides the *aṅguli* into eight *yavas*, barley grains, or into thirty-four *tilas* (seeds of the sesame). I have no doubt that the second division which I have not elsewhere met, owns its origin to the *savis'esha*. The *aṅguli* being the measure most in use, it was convenient to have a special word for its thirty-fourth part, and to be able to say "sixteen *aṅgulis*, thirty-three *tilas*", instead of "sixteen *aṅgulis*, and thirty-three thirty-fourths of an *aṅguli*." Therefore some plant was searched for of which thirty-four seeds might be considered as equal in

length to one añguli; if the tilas really had that exact property, was after all a matter of little relevancy.

Having once acquired the knowledge of the Pythagorean proposition, it was easy to perform a great number of the required geometrical operations. The diagonal of a square being the side of a square of double the size, was, as we have seen, called dvikaraṇi; by forming with this dvikaraṇi and the side of the square an oblong and drawing the diagonal of this oblong, they got the trikaraṇi or the side of a square the area of which was equal to three squares of the first size.

Baudh. A'past. Kāty.

प्रमाणं त्रियग्विकरणायामस्तस्याक्षरज्जुलिकरणी ।

Take the measure (the side of a square) for the breadth, the diagonal for the length (of an oblong); the diagonal cord is the trikaraṇi.

By continuing to form new oblongs and to draw their diagonals, squares could be constructed, equal in area to any number of squares of the first size. Often the process could be shortened by skilful combination of different karaṇis. Kātyāyana furnishes us with some examples.

षट्पदं त्रियङ्गुलानी त्रिपदा पार्श्वमानी तस्याक्षरज्जुदशकरणी ।

Take a pada for the breadth, three padas for the length of an oblong; the diagonal is the das'akaraṇi (the square of the diagonal comprises ten square padas, for it combines the square of the karaṇi of one pada and of the navakaraṇi which is three padas long).

द्विपदा त्रियङ्गुलानी षट्पदा पार्श्वमानी तस्याक्षरज्जुचत्वारिंशत्करणी ।

Take two padas for the breadth, six padas for the length of an oblong; the diagonal is the chatvāriṃśat-karaṇi, the side of a square of forty square padas ($2^2 + 6^2 = 40$).

On the other hand, any part of a given square could be found by similar proceedings.

Baudhāyana, after the rule for the trikaraṇi:

तृतीयकरणेतेन व्याख्याता नवमस्तु भूमेर्भागो भवतीति ।

Thereby is explained the tṛtīyakaraṇi, the side of a square the area of which is the third part of the area of a given square; it is the ninth part of the area.

A'pastamba:

तृतीयकरणेतेन व्याख्याता विभागस्तु नवधा ।

Kātyāyana:

तृतीयकरणेतेन व्याख्याता प्रमाणविभागस्तु नवधा । करणीतृतीयं नवभागो नवभाग-
स्त्यस्तृतीयकरणी ।

Baudhāyana's and A'pastamba's commentators disagree in the explanation of the sūtra; the methods they teach are, however, both legitimate. Dvārakānāthayajvan directs us to divide the given square into nine small squares by dividing the side into three parts, and to form with the side and the diagonal of one of these small squares an oblong; the diagonal of this oblong is the tṛtīyakaraṇī.

Kapardisvāmin proposes to find the trikarāṇī of the given square and to divide it into three parts; one of these parts is the tṛtīyakaraṇī; for its square is the ninth part of a square of three times the area of the given square, and therefore the third part of the given square. This explanation seems preferable, as it preserves better the connexion of the rule with the preceding rule for the trikarāṇī.

The fourth, fifth, &c., parts of a square were found in the same way.

A'pastamba and Kātyāyana give some special examples illustrating the manner in which the increase or decrease of the side affects the increase and decrease of the square.

A'pastamba :

अर्धपुरुषा रज्जुर्द्धा सपादौ करोत्यर्धतृतीयपुरुषा षट् सपादान् ।

A cord of the length of one and a half purusha produces two square purushas and a quarter; and a cord of the length of two purushas and a half produces six square-purushas and a quarter.

Kātyāyana :

द्विः प्रमाणा चतुःकरणी त्रिः प्रमाणा नदकरणी चतुःप्रमाणा षोडशकरणी ।

A cord of double the length produces four (squares); one of three times the length produces nine, and one of four times the length produces sixteen.

A'pastamba and Kātyāyana :

अर्धप्रमाणेन पादप्रमाणं विधीयते ।

By a measure of half the length a square is produced equal to the fourth part of the original square.

A'pastamba :

तृतीयेन नवमी कला ।

Kātyāyana :

तृतीयेन नवमोऽंशः ।

By the third part the ninth part is produced.

Kātyāyana :

चतुर्थेन षोडशी कला ।

The sixteenth part is produced by the fourth part.

Next follow the rules for squares of different size.

A'pastamba :

तुल्ययोश्चतुरस्रयोश्चतुःसमासः । नानाप्रमाणयोश्चतुरस्रयोः समासः । ऋषीयसः करणा वर्यीयसो द्वाभ्युज्जिखेत् । द्वाभ्यात्तुल्यारज्जुर्द्वे समस्यति ।

Baudhāyana :

नानाचतुरस्रे समस्यन्कनीयसः करणा वर्षीयसो दृभ्रमुज्जिखेदृभ्रस्याक्षयारज्जुः सम-
स्तथाः पार्श्वमानी भवति ।

For a literal translation of this difficult sūtra and a discussion of the word "vridhra", see the 'Paṇḍit' of June 1st, 1875, p. 17. The sense is as follows :

A'pastamba : The combining of two squares of equal size has been taught ; the following is the method for combining two squares of different sizes. Cut off from the larger square an oblong with the side of the smaller square (*i.e.*, an oblong one side of which is formed by the side of the larger square, the other by that of the smaller square) ; the diagonal of this oblong combines both squares (is the side of a square the area of which is equal to the area of both the given squares together).

Baudhāyana :

If you wish to combine two squares of different size, cut off an oblong from the larger square with the side of the smaller one ; the diagonal of that oblong is the side of both squares combined.

Kātyāyana :

समचतुरस्राणामुक्तः समासो नानाप्रमाणसमासे ऋसीयसः करणा वर्षीयसोऽपच्छि-
न्द्यात्तस्याक्षयारज्जुः समस्यतीति समासः ।

The method needs no further explanation ; it is in fact the same we employ for the same purpose.

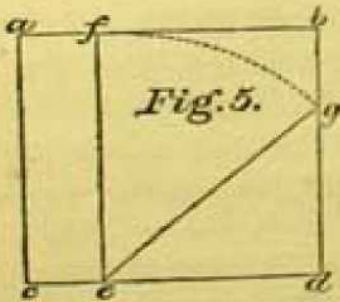
We proceed to the rule for deducting one square from another.

Baudhāyana, A'pastamba :

चतुरस्राचतुरस्रं निर्जिहीर्षन्यावद्विर्जिहीर्षेत्तस्य करणा वर्षीयसो दृभ्रमुज्जिखेदृभ्रस्य
पार्श्वमानीमक्षयैतरत्यार्धमुपसङ्गरेत्वा यव निपतेत्तदपच्छिन्द्याच्छिन्नया निरस्तम् ।

See the 'Paṇḍit', *loc. cit.*

If you wish to deduct one square from another, cut off from the larger one an oblong with the side of the smaller one ; draw one of the sides of that oblong across to the other side ; where it touches the other side, that piece cut off ; by it the deduction is made.



a b c d = the larger square ; cut off from it the oblong b d e f, in which e d and b f are equal to the side of the smaller square which is to be deducted. Fasten a cord e f at e, and draw it across the oblong into the position e g ; then d g is the side of a square the area of which is equal to the difference of the two given squares. ($dg^2 = eg^2 - ed^2$).

Kātyāyana words his rule as follows :

चतुरस्राचतुरस्रं निर्जिहीर्षन्यावद्विर्जिहीर्षेत्तावदुभयतोऽपच्छिद्य शङ्क निखाय पार्श्व-

मानीं कृत्वा पाश्चिमान्नीसंमितामच्छेत्वा तत्रोपसंहरति स समासेऽपच्छेदः स क षोप निर्हासः।

A'pastamba illustrates the rule by an example :

उपसंहरताच्छेदयारज्यः सा चतुःकरणो। विद्वा चेतरे च यत्प्रयम्भते कुरुतस्तदुभयं करोति। तिर्यग्द्वानो पुरुषं शेषस्त्रीन्।

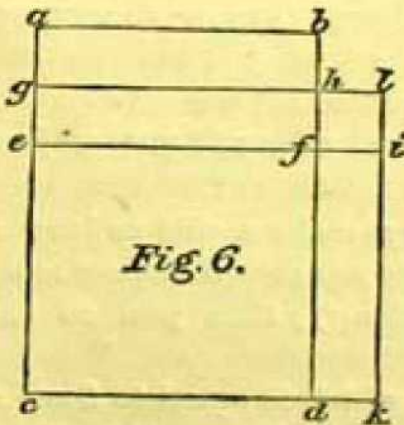
The question is about a square of four square purushas, from which a square of one square purusha is to be deducted. The diagonal (e g), which has been drawn across the oblong, is the side of a square of four purushas, and produces by itself as much as the cut-off side (g d) and the other side (e d) produce separately. The breadth of the oblong (e d) is the side of one square purusha ; the rest—the other side, d g—the side of three square purushas.

In order to combine oblongs with squares, a rule was wanted for turning oblongs into squares.

Baudhāyana :

दीर्घचतुरस्रं समचतुरस्रं चिकीर्षंस्तिर्यग्द्वानीं करणीं कृत्वा शेषं द्वेधा विभज्य विपर्यस्येतरत्रोपदध्यात् खण्डमावापेन तत्संपूरयेत्तस्य निर्हास उक्तः।

In order to turn an oblong into a square, take the breadth of the oblong for the side of the square ; divide the rest of the oblong into two parts, and inverting their places join those two parts to two sides of the square. Fill the empty place with an added piece. The deduction of this has been taught.



That means : if you wish to turn the oblong a b c d into a square, cut off from the oblong the square c d e f, the side of which is equal to the breadth of the oblong ; divide a b e f, the rest of the oblong, into two parts, a b g h and g h e f ; take a b g h, and place it into the position d f i k ; fill up the empty place in the corner by the small square f h l i ; then deduct by samachaturasranirhāra the small square f h l i from the large square g l k c ; the square you get by this deduction will be equal to the oblong a b c d.

A'pastamba gives the same rule :

दीर्घचतुरस्रं समचतुरस्रं चिकीर्षन्तिर्यग्द्वान्यापच्छिद्य शेषं विभज्योभयत उपदध्यात्। खण्डमागन्तुना संपूरयेत्। तस्य निर्हास उक्तः।

And Kātyāyana :

दीर्घचतुरस्रं समचतुरस्रं चिकीर्षन्नाथे तिर्यगपच्छिद्यान्यतरदिभज्येतरत्पुस्ताद्वि-
णतत्रोपदध्याच्छेयमागन्तुना पूरयेत्तस्योक्तो निर्हासः।

When one side of the oblong which had to be turned into a square, was more than double the length of the other, it was not sufficient to cut off a square once, but this had to be done several times, according to the length of the oblong, and finally all squares had to be combined into one.

Kātyāyana has a rule to this purpose :

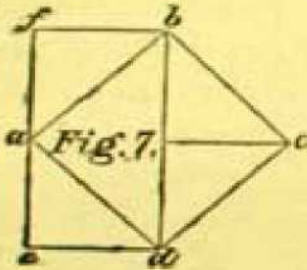
अतिदीर्घं चेत् तिर्यङ्गान्यापच्छिद्यापच्छिद्यैकसमासेन समस्य शेषं यथायोगमुपसं-
हरत् ।

I add the rules for the reverse process, the turning of a square into an oblong.

Baudhāyana :

समचतुरस्रं दीर्घचतुरस्रं चिकीर्षन्तस्याक्ष्णशापच्छिद्य भागं द्वेधा विभज्य पार्श्वयोः प-
दध्याद्यथायोगम् ।

If you wish to turn a square into an oblong, divide it by the diagonal; divide again one of the two halves into two parts, and join these two parts to the two sides (those two sides of the other half which form the right angle) as it fits (when joining them, join those sides which fit together).



Proceeding as directed, we turn the square a b c d into the oblong b d e f. This rule is, of course, very imperfect as it enables us to turn the square into one oblong only.

Kātyāyana has the following :

समचतुरस्रं दीर्घचतुरस्रं चिकीर्षन्मध्येऽक्ष्णशापच्छिद्य विभज्येतरत्वरस्तादुत्तरतयोप-
दध्यात् ।

Āpastamba's rule helps us somewhat further :

समचतुरस्रं दीर्घचतुरस्रं चिकीर्षन्वाचिकीर्षत्तावतीं पार्श्वमानीं कृत्वा यदधिकं स्यात्त-
द्यथायोगमुपदध्यात् ।

In order to turn a square into an oblong, make a side as long as you wish the oblong to be (i. e., cut off from the square an oblong one side of which is equal to one side of the desired oblong); then join to that the remaining portion as it fits.

Given for instance a square the side of which is equal to five, and required an oblong one side of which is equal to three. Cut off from the square an oblong the sides of which are five and three. There remains an oblong the sides of which are five and two; from this we cut off an oblong of three by two, and join it to the oblong of five by three. There remains a square of two by two, instead of which we take an oblong of 3 by $1\frac{1}{2}$. Joining this oblong to the two oblongs joined previously we get altogether an oblong of 3 by $8\frac{1}{2}$, the area of which is equal to the area of the square 5 by 5.

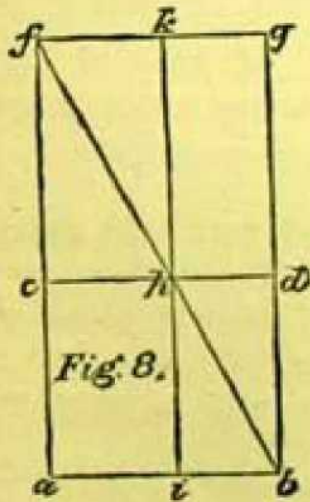
In this way the *sūtra*, as it appears from the commentaries, must be explained. The method taught in it was no doubt sufficient for most cases, but it cannot be called a really geometrical method.

I subjoin the description of a method for turning squares into oblongs, which is given by Baudhāyana's commentator, although it is not founded on the text of the *sūtras*. He, after having explained Baudhāyana's way of proceeding, continues—

अन्यथ प्रकारः । यावदिच्छं पार्श्वमान्यौ प्राच्यौ वर्धयित्वा उत्तरपूर्वां कर्णरज्जुमायच्छे-
त्वा दीर्घचतुरस्रमध्यस्थायां समचतुरस्रतिर्यङ्मान्यां यत्र निपतति तत्र उत्तरं हित्वा दक्षि-
णां तिर्यङ्मान्यां कुर्यात् । तदीर्घचतुरस्रं भवति ।

And there is another method. Lengthen the north side and the south side of the square towards east by as much as you want (*i. e.*, give to them the length of the oblong you wish to construct) and stretch (through the oblong formed by the two lengthened sides and the lines joining their ends) a cord in the diagonal from the north-east to the south-west corner. This diagonal cuts the east side of the square, which (side) runs through the middle of the oblong. Putting aside that part of the cut line which lies to the north of the point of intersection, take the southern part for the breadth; this is the required oblong.

For example :



Given the square $a b c d$ and required an oblong of the same area and of the length $b g$. Lengthen $a c$ and $b d$ into $a f$ and $b g$; draw $f g$ parallel to $c d$; draw the diagonal $f b$, which cuts $c d$ at h ; draw $i k$ parallel to $a f$ and $b g$; then $b g i k$ is the desired oblong.

This method is purely geometrical and perfectly satisfactory; for $a b f = b f g$, and $b d h = b h i$ and $c f h = f h k$; therefore $a c h i = d g h k$, and consequently $a b c d = b g k i$. *Q. E. D.*

In this place now we have to mention the rules which are given at the beginning of the *sūtras*, the rules, as they call it, for making a square, in reality for drawing one line at right angles upon another. Their right place is here, after the general propositions about the diagonal of squares and oblongs, upon which they are founded.

Baudhāyana :

प्रमाणान् द्विगुणां रज्जुमुभयतः पार्श्वौ कृत्वा मध्ये लक्षणं करोति । स प्राच्यर्थः
अपरस्मिन्नार्थं चतुर्भागेन लक्षणं करोति । मध्यवर्त्तनम् । अर्धेऽर्धम् । इत्यान्तयोः पार्श्वौ
प्रतिमुख्यं व्यवहरेण दक्षिणापार्श्वार्धेनार्धेन चाण्डालं सार्धं चरेत् ।

Make two ties at the ends of a cord the length of which is double

the measure (of the side of the required square) and a mark at its middle. This piece of the cord (*i. e.*, its half) gives us the *prāchī* (of the required square; the *prāchī* of a square has the same length as its side). Then make a mark at the western half of the cord less the fourth part (of the half. If we wish, for instance, to make a square the side of which is twelve *padas* long, we take a cord twenty-four *padas* long; stretching this cord on the ground from the west towards the east, we find its middle by a measurement beginning from the western end, and having fixed the point which lies at the distance of twelve *padas* from both ends, we measure three *padas* back, towards the west, and make at the point we arrive at a mark; this mark divides the cord into two parts of 15 and 9 *padas* length). The name of this mark is *nyañchhana*. Then another mark is to be made at the half (of the western half of the cord), in order to fix by it the four corners of the square. (This second sign is at a distance of 18 *padas* from the eastern end of the cord.) Having fastened the two ties at the ends of the *prishṭhyā* line, we take the cord at the *nyañchhana* mark and stretch it towards the south; the four corners of the square are then fixed by the half (of the cord).

The same method is known to A'pastamba :

आयामं वाभ्यस्यागन्तुचतुर्थमायामयात्त्रयारञ्जस्तिर्यङ्ग्यानी शेषः ।

Or the length of the *prāchī* of the desired square, is to be doubled; the length and the fourth part of the added piece form the diagonal cord; the rest, *i. e.* three quarters of the added piece form the breadth (the shorter side of the oblong).

And the S'ulvaparis'ishta :

प्रमाणमभ्यस्याभ्यासचतुर्थे लक्षणं करोति तद्विरञ्जनमष्टया तिर्यङ्ग्यानी शेषः ।

These rules make use of one of the Pythagorean triangles which were, as we have seen above, known to the *Sūtrakāras*, *viz.* of that one the sides of which are equal to three, four, and five. It recommended itself by the ease with which the three sides can be expressed in terms of each other, 3 + 5 being the double of 4, and 3 being equal to half the sum of 3 and 5, minus one quarter of half that sum.

Of course any other oblong with measurable sides and diagonal could be employed for the same purpose, and so we find in A'pastamba a rule for *chaturasrakarana* abstracted from the *dirghachaturasra*, of which the sides are five and twelve and the diagonal thirteen.

यावदायामं प्रमाणं तदर्थमभ्यस्यापरस्मिन् कृतीये षड्भागोने लक्षणं करोति । शृङ्गा-
नयोरनौ नियम्य लक्षणेन दक्षिणापायस्य निमित्तं करोति । एवमुत्तरतः । विपर्यस्येतरत
स समाधिः ।

Take a measure equal to the length (of the side and *prāchī* of the desired square) and increase it by its half. Make a mark at the western third less its sixth part. Fasten the ends of the cord, &c.

Increase 12 by 6; result 18; make a mark at a third, (reckoning from 18; that would be at 12) less the sixth part of that third (*i. e.*, a sixth part before the third) *i. e.*, at 13. Thus we get a rectangular triangle of 5, 12, 13.

The same rule in the *S'ulvaparis'ishta* :

प्रमाणार्धं वाभ्यस्याभ्यासपष्ठे लक्षणं करोति तद्विरञ्चनमद्वयया नियंक्ष्यानी शेषः ।

Here, as in many other places, the *paris'ishta* is much clearer and more practical in the wording of its rules than the more ancient *sūtras*. The mark is, according to its expression, to be made not at the western third less its sixth part, but simply at a sixth of the added piece (6 is added to 12; the mark is made at 13).

Another method for *chaturasrakarapa*, taught by *A'pastamba* only, makes use of the above-mentioned *savis'esha*.

इष्टान्तयोर्मध्ये च शङ्कुं निहत्यार्धं तद्विशेषमभ्यस्य लक्षणं कृतार्धमागमयेदन्तयोः पाशौ कृत्वा मध्यमे सविशेषं प्रतिमुच्य पूर्वस्मिन्नितरं लक्षणेन दक्षिणमसमायच्छेदुमुच्य पूर्वस्मादपरस्मिन्प्रतिमुच्य लक्षणेनैव दक्षिणमश्लिष्यमायच्छेदेवमुत्तरो श्लिष्यसौ ।

Fix poles on both ends and the middle of the *prishṭhyá* line, add to a cord of half the length (of the *prishṭhyá*) its *vis'esha*, *i. e.*, its third plus the fourth part of the third minus the thirty-fourth part of that fourth part, and add moreover a piece of the length of half the *prishṭhyá*, after having made a mark (to separate the two parts of the cord). Then tie the *savis'esha* part of the cord to the middle pole, the other part to the eastern pole, and fix the south-east corner of the square by stretching the cord (towards the south), having taken it at the mark. Untie the end of the cord from the eastern pole, &c.

This method is of course inferior to those described above and certainly unnecessary; *Baudhāyana* does not mention it.

I subjoin the remaining methods for *chaturasrakarapa*, which do not presuppose the knowledge of the Pythagorean theorem.

Apastamba :

प्रमाणाचीमसं रज्जुमुभयतः पाशां करोति । मध्ये लक्षणमर्धमध्ययोश्च । इष्टायां रज्जुमायस्य पाशयोर्लक्षणेऽस्त्विति शङ्कुद्वित्रिचत्वारिपान्त्ययोः पाशौ प्रतिमुच्य मध्यमेन लक्षणेन दक्षिणापायस्य निमित्तं करोति मध्यमे पाशौ प्रतिमुच्योपर्युपरिनिमित्तं मध्यमेन लक्षणेन दक्षिणापायस्य शङ्कुं निहन्ति तस्मिन्पाशं प्रतिमुच्य पूर्वस्मिन्नितरं मध्यमेन लक्षणेन दक्षिणमसमायच्छेदुमुच्य पूर्वस्मादपरस्मिन्प्रतिमुच्य मध्यमेनैव लक्षणेन दक्षिणमश्लिष्यमायच्छेदेवमुत्तरो श्लिष्यसौ ।

Take a cord of the length of the measure (of the side of the required square), and make ties at both its ends, a mark at its middle and at the middle points of its halves. Stretch the cord on the *prishṭhyá* line, and fix poles on the points marked by the two ties of the cord and by the three

marks (five poles altogether). Fasten the ties at the second and fourth poles (reckoning from the east), stretch the cord towards the south having taken it by the middle mark, and make at the point, touched by the mark, a mark on the ground. Then fastening both ties at the middle pole, stretch the cord over the mark on the ground towards the south, having taken it by the middle mark, and fix a pole (at the spot reached by the stretched, doubled up, cord). Then fastening one tie at this pole and the other tie at the pole standing at the eastern end of the *práchi*, fix the south-east corner of the square by stretching the cord, having taken it by the middle mark. Then untying the rope from the eastern pole and fastening it at the western pole, fix the south-west corner, &c.; in the same way the north-east and north-west corner are found.

In this procedure the first step is to find the middle of the southern and of the northern sides of the required square by drawing a line at right angles through the middle point of the *práchi*. The method employed here for drawing a line at right angles on another is the simplest of all known to the *S'ulvasūtras*, and essentially the same we make use of when describing intersecting arcs from two points equally distant to the right and left from some given point. In the later portions of the *sūtras* this method is enjoined for the measurement of the *agni* (instead of cords canes of a certain length had to be employed there), and the followers of the White Yajur Veda had adopted it for the same purpose (see *Indische Studien*, XIII., p. 233, ff.).

The second part of the procedure—to find the four corners of the square after having found the middle points of the sides—was of course easy and does not afford any special interest.

To Baudháyana the same method is known, but he restricts it in his *paribhášhá-sūtras* to the construction of oblongs; clearly without sufficient reason, since the method refers only to the construction of right angles, and the length of the sides is of no importance. A'pastamba gives no special rule at all for oblongs, and it is indeed not wanted.

I subjoin Baudháyana's rule:

दीर्घचतुरस्रं चिकीर्षन् यावच्चिकीर्षेत्तावत्तां भूमौ द्वौ शङ्कुं निहत्यात् । द्वौ द्वावकर्म-के-
भितः समौ । यावती तिर्यङ्मानौ तावतीऽऽ रज्जुमुभयतः पाशौ कृत्वा मध्ये लक्षणं करोति ।
पूर्वेषामन्त्ययोः पाशौ प्रतिमुख्य लक्षणेन दक्षिणायम्य लक्षणे लक्षणं करोति । मध्ये
पाशौ प्रतिमुख्य लक्षणस्थोपरिष्ठादक्षिणापायम्य लक्षणे शङ्कुं निहत्यात् । सोऽऽस एतेनो-
त्तरोऽऽसो व्याख्यातस्तथा श्रेणी ।

He who wishes to make an oblong is to fix two poles on an area of the length which he intends to give to the oblong (*i. e.*, at the two ends of the *práchi* of that area). On both sides, *i. e.*, on the west and east sides

of both these poles two other poles are to be fixed at equal distances. Then taking a cord of the length one intends to give to the side line (breadth) of the oblong, one makes ties at both its ends and a mark at its middle. Then one fastens the two ties at those two of the three eastern poles, which stand at the outside, stretches the cord towards the south holding it by the mark, and makes on this mark (*i. e.*, on the spot where the mark touches the ground after the cord has been stretched) a mark. Then fastening both ties at the middle pole one stretches the cord over the mark (on the ground) towards the south, and fixes a pole on the mark (*i. e.*, on the spot touched by the mark on the cord). That is the south-east corner of the oblong; thereby are explained likewise the north-east corner and the two western corners.

In the last place I give a method of *chaturās'rakarana*, which is found in *Baudhāyana* only, but there in the first place. It seems to be the most ancient of all the methods enumerated.

चतुरस्रं चिकीर्षन् यावच्चिकीर्षेत्तावतीं रज्जुमुभयतः पाशां कृत्वा मध्ये लचणं करोति ।
लेखामाविष्य तस्या मध्ये शङ्कुं निहत्यात्तस्मिन्पाशे प्रतिमुच्य लचणेन मण्डलं परिलिखेत् ।
विष्कम्भान्तयोः शङ्कुं निहत्यात् । पूर्वस्मिन्पाशं प्रतिमुच्य पाशेन मण्डलं परिलिखेत् । एव-
मपरस्मिन्लेखे यत्र समयातां तेन द्वितीयं विष्कम्भमायच्छेत् । विष्कम्भान्तयोः शङ्कुं निहत्यात् ।
पूर्वस्मिन्पाशे प्रतिमुच्य लचणेन मण्डलं परिलिखेत् । एवं दक्षिणत एवं पश्चादेवमुत्तरत-
लेखां येऽन्याः सः सर्गास्तचतुरस्रं संपद्यते ।

If you wish to make a square, take a cord of the length which you desire to give to the side of the square, make a tie at both its ends and a mark at its middle; then having drawn the *prāchī* line, fix a pole in its middle, and having fastened at that pole the two ties of the cord, describe with the mark a circle round it. Then fix poles at both ends of the diameter (formed by the *prāchī*), and having fastened one tie at the eastern pole (the pole standing at the east end of the *prāchī*), describe a circle with the other tie (*i. e.*, with the full length of the cord). In the same manner a circle is described round the pole at the west end of the *prāchī*, and another diameter is drawn joining the points in which these two circles intersect (this diameter is the line pointing to the north and south points). A pole is fixed at both ends of this diameter. Having fastened both ties at the eastern pole, describe a circle round it with the mark. The same is to be done in the south, the west, and the north (*i. e.*, circles are to be described round the three other poles); the points of intersection of these four circles which (*i. e.*, the points) are situated in the four intermediate regions (north-east, north-west, &c.,) are the four corners of the required square.

Diagram 9.

Passing over some rules of less importance, I proceed to those which refer to the "squaring of the circle." It certainly is a matter of some in-

terest to see the old ácháryas attempting this problem, which has since haunted so many unquiet minds. It is true the motives leading them to the investigation were vastly different from those of their followers in this arduous task. Theirs was not the disinterested love of research which distinguishes true science, nor the inordinate craving of undisciplined minds for the solution of riddles which reason tells us cannot be solved; theirs was simply the earnest desire to render their sacrifice in all its particulars acceptable to the gods, and to deserve the boons which the gods confer in return upon the faithful and conscientious worshipper.

It is true that they were not quite so successful in their endeavours as we might wish, and that their rules are primitive in the highest degree; but this tends at least to establish their high antiquity.

The rules are the following:

Baudháyana :

चतुरस्रं मण्डलं चिकीर्षन्नध्यायार्थं मध्यात्प्राचीमध्यापातयेद्यदतिश्रियते तस्य स्रष्टृतीयेन मण्डलं परिलिखेत् ।

If you wish to turn a square into a circle, draw half of the cord stretched in the diagonal from the centre towards the práchí line (the line passing through the centre of the square and running exactly from the west towards the east); describe the circle together with the third part of that piece of the cord which will lie outside the square.

See diagram 10.

A cord is to be stretched from the centre *e* of the square *a b c d* towards the corner *a*; then the cord, being tied to a pole at *e*, is drawn towards the right hand side until it coincides in its position with the line *e f*; a piece of the cord, *f h*, will then of course lie outside the square. This piece is to be divided into three parts, and one of these three parts, *f g*, together with the piece *e f*, forms the radius of the circle, the area of which is to be equal to the area of the square *a b c d*.

A'pastamba gives the same rule in different words:

चतुरस्रं मण्डलं चिकीर्षन्नध्यात्कोट्यां निपातयेत् पार्श्वतः परिलिख्यातिश्रयष्टृतीयेन स्रष्टृ मण्डलं परिलिखेत् । सा नित्या मण्डलम् । यावद्धीयते तावदागन्तु ।

If you wish to turn a square into a circle, stretch a cord from the centre towards one of the corners, draw it round the side and describe the circle together with the third part of the piece standing over; this line gives a circle exactly as large as the square; for as much as there is cut off from the square (*viz.* the corners of the square), quite as much is added to it (*viz.* the segments of the circle, lying outside the square).

I must remark that Kapardisvámin, A'pastamba's commentator, combines the two words "*sá nityá*" into *sánityá* (= *sá anityá*), and explains: this line gives a circle, which is not exactly equal to the square. But I am

afraid we should not be justified in giving to A'pastamba the benefit of this explanation. The words 'yāvad dhīyate, &c.' seem to indicate that he was perfectly satisfied with the accuracy of his method and not superior, in this point, to so many circle-squarers of later times. The commentator who, with the mathematical knowledge of his time, knew that the rule was an imperfect one, preferred very naturally the interpretation which was more creditable to his author.

Kātyāyana's *S'ulvapariśiṣṭa* :

चतुरस्रं मण्डलं चिकीर्षन्मध्यादङ्गं निपात्य पार्श्वतः परिलिख्य तत्र यदतिरिक्तं भवति तस्य द्वितीयेन स्रष्टु मण्डलं परिलिखेत् ।

Let us now see what the result of the above rule would be by making the side of the square equal to 2. $a c = 2$; $a i = 1$; $a e = \sqrt{2} = 1.414213...$; $\frac{0.414213}{3} = 0.138071$; radius of the circle $= 1.138071$.

Multiplying the square of 1.138071 by $\pi = 3.141592...$, we find as area of the circle: 4.069008....., while the area of the square $= 4$.

The next thing was to find a rule for turning a circle into a square. There we have at first a rule given by Baudhāyana only :

मण्डलं चतुरस्रं चिकीर्षन्विष्कम्भमष्टौ भागान्कृत्वा भागमेकौनविंशतिं श्रद्धा विभज्याष्टविंशतिभागानुदरेद्भागस्य च षष्ठमष्टमभागानम् ।

If you wish to turn a circle into a square, divide the diameter into eight parts, and again one of these eight parts into twenty-nine parts; of these twenty-nine parts remove twenty-eight and moreover the sixth part (of the one left part) less the eighth part (of the sixth part).

The meaning is: $\frac{7}{8} + \frac{1}{8 \cdot 29} - \frac{1}{8 \cdot 29 \cdot 6} + \frac{1}{8 \cdot 29 \cdot 6 \cdot 8}$ of the diameter of a circle is the side of a square the area of which is equal to the area of the circle.

Considering this rule closer, we find that it is nothing but the reverse of the rule for turning a square into a circle.

It is clear, however, that the steps taken according to this latter rule could not be traced back by means of a geometrical construction; for if we have a circle given to us, nothing indicates what part of the diameter is to be taken as the "atis'ayātritaya" (the piece f g in diagram 10).

It was therefore necessary to express the rule for turning a square into a circle in numbers. This was done by making use of the "saviś'esha", which we have considered above. Baudhāyana assumed a i as equal to 12 āṅgulis ($= 408$ tilas), and therefore a e $= 16$ āṅgulis, 33 tilas. Difference $= 4$ āṅg, 33 til. $= 169$ til.; the third part of this difference $= 56\frac{1}{3}$ til. Ra-

dus of the circle = $e f (= a i) + g f = 408 \text{ til.} + 56\frac{1}{2} \text{ til.} = 464\frac{1}{2} \text{ til.}$ In other words: if half the side of a square is 408 til. long, the length of the radius of a circle, which is equal in area to the square, amounts to $464\frac{1}{2} \text{ til.}$; or, if the radius of a circle is $464\frac{1}{2} \text{ til.}$, half the side of the corresponding square is 412 til. In order to avoid the fraction, both numbers were turned into thirds, and the radius made = 1393, half the side = 1224. Finally, the diameter was taken instead of the radius, and the whole side of the square instead of half the side.

To generalize this rule, it was requisite to express 1224 in terms of 1393. One eighth of 1393 = $174\frac{1}{8}$; this multiplied by 7 = $1218\frac{1}{2}$. Difference between $1218\frac{1}{2}$ and 1224 = $5\frac{1}{2}$. Dividing 174 (Baudhāyana takes 174, instead of $174\frac{1}{8}$, neglecting the fraction as either insignificant or, more likely, as inconvenient) by 29 we get 6; subtracting from 6 its sixth part we get 5 and adding to this the eighth part of the sixth part of six, we get $5\frac{1}{8}$.

In other words: $1224 = \frac{7}{8} + \frac{1}{8 \cdot 29} - \frac{1}{8 \cdot 29 \cdot 6} + \frac{1}{8 \cdot 29 \cdot 6 \cdot 8}$ of 1393

(due allowance made for the neglected $\frac{1}{8}$.)

Another simpler and less accurate rule for squaring the circle is common to the three *Sūtrakārās*.

Baudhāyana :

अपि वा पञ्चदश भागान्छत्वा द्वावुदरेदेषानित्या चतुरस्रकरणी ।

Or else divide (the diameter) into fifteen parts and remove two; that (the remaining thirteen parts) is the gross side of the square.

A'pastamba :

मण्डलं चतुरस्रं चिकीर्षन्विष्कम्भं पञ्चदश भागान्छत्वा द्वावुदरेत्तयोदशावशिष्यन्ते सा नित्या चतुरस्रम् ।

Kātyāyana :

मण्डलं चतुरस्रं चिकीर्षन्विष्कम्भं पञ्चदश भागान्छत्वा द्वावुदरेच्छेषः करणी ।

If we assume a circle with 15 for diameter, the area of the corresponding square would, according to this rule, be 169, while the area of the circle is 176. 714.....

These are the most interesting of the *paribhāsha-sūtras*. In the following I shall extract the description of three kinds of the *agnichayana*, of the *vakrapakshas'yenachiti*, as given by A'pastamba; of the *sārarathachakra-chiti* and of the *s'mas'ānachiti*. The two latter are described by Baudhāyana only. I select these three *chitis*, because the first of them was, as it appears, most in use, and because some particular skill was required for the construction of the *agnikshetra* of the two latter *chitis*.

The vakrapaksha s'yena itself could be constructed in different forms. Two forms are described by Baudháyana, two by A'pastamba. And as two different prastáras were necessary for each chiti, we have altogether eight different prastáras for the vakrapaksha s'yena, each of them consisting of two hundred bricks. The following extract contains A'pastamba's rules for the first kind of the vakrapaksha s'yena.

(Description and diagrams of all the other kinds will be given in the 'Paṇḍit'. A sketch of one prastára of the second kind of the s'yenachiti is to be found in Burnell's Catalogue; it is, as we are informed there, taken from an agni actually constructed and used. There is, however, an error in the reference to the sūtra according to which it is said to be constructed, this sūtra not being Baudháyana's, but A'pastamba's, paṭala VI.)

येनचितं चिन्वीन सुवर्गेकाम इति विज्ञायते ।

He who wishes for heaven, may construct the altar shaped like a falcon; this is the tradition.

वक्रपक्षो बलपुच्छो भवति ।

His wings are bent and his tail spread out.

पश्चात्प्राङ्दुश्चति पुरस्तात्प्रत्यङ्दुश्चति ।

On the west side the wings are to be drawn towards the east, on the east side towards the west.

एवमिव हि वयसां मध्ये पक्षनिर्णामो भवतीति विज्ञायते ।

For such is the curvature of the wings in the middle of the birds, says the tradition.

यावानग्निः सारत्विप्रादेशः सप्तविधः संपद्यते प्रादेशं चतुर्यमात्मनश्चतुर्भागीयाद्याष्टौ तासां तिस्रः शिर इतरत्यक्षयोर्विभजेत् ।

Of the whole area covered by the sevenfold agni with aratni and prádes'a take the prádes'a, the fourth part of the átman (body without head, wings, and tail) and eight quarter bricks; of those latter, six form the head of the falcon; the remainder is to be divided between the two wings.

This sūtra determines what portions of the legitimate area of the agni have to be allotted to the different parts of the falcon construction. The whole area of the saptavidha agni is seven purushas with the addition of the two aratnis on the wings and the prádes'a of the tail, altogether $7\frac{1}{2}$ purushas. Now the fourth part of the átman (of the primitive s'yenachiti) = one purusha and the prádes'a, i. e., an oblong of 120 añgulis by 12 añgulis = $\frac{1}{8}$ square purusha and eight quarter bricks, (i. e., square bricks the side of which is equal to the fourth part of a purusha = 30 añgulis, so that they cover together an area of $\frac{1}{2}$ square purusha) are given to the wings in addi-

tion to the area which they cover in the primitive agni, only they have to cede in their turn three of the eight quarter bricks, which are employed for the formation of the head. The original area of both wings together being $2\frac{1}{2}$ purushas, their increased area amounts to $2\frac{1}{2} + 1\frac{1}{2} - \frac{1}{6} = 3\frac{1}{6}$ square purushas, for one wing to $1\frac{2}{3}$ square purushas.

अर्धदशमा अरत्नयोऽङ्गुलिश्च चतुर्भागोना पचाशामः ।

Nine and a half aratnis (= 238 aṅgulis) and three quarters of an aṅguli are the length of the wing.

The breadth of the wing is the same as in the primitive s'yena, *i. e.*, = one purusha = 120 aṅgulis. Dividing the area of the wing mentioned above by the breadth we get the length. Up to this, the wing has the shape of a regular oblong ; the following rules show how to produce the curvature.

द्विपुरुषां रज्जुमुभयतः पाशां करोति मध्ये लक्षणम् ।

Make ties at both ends of a cord of two purushas length and a mark in its middle.

पचस्यापरयोः कोट्यारत्नौ नियम्य लक्षणेन प्राचीनमायच्छेदेन पुरस्तात् निर्णामः ।

Having fastened the two ends of the cord at the two western corners of the oblong forming the wing, take it by the mark and stretch it towards the east ; the same is to be done on the eastern side (*i. e.*, the cord is fastened at the two east corners and stretched towards the east). This is the curvature of the wings.

By stretching the cord, fastened at the west corners, a triangle is formed by the west side of the oblong and the two halves of the cord, and this triangle has to be taken away from the area of the wing. In its stead the triangle formed, when the cord is stretched from the eastern corners, is added to the wing.

एतेनोत्तरः पचः व्याख्यातः ।

Thereby the northern wing is explained.

The curvature is brought about in the same way.

आत्मा द्विपुरुषायामोऽर्धपुरुषव्यासः ।

The ātman is two purushas long, one and a half purushas broad.

This is not the final area of the ātman, as we shall see further on ; but an oblong of the stated dimensions has to be constructed and by cutting pieces from it we get the area we want.

पुच्छेऽर्धपुरुषव्यासं पुरुषं प्रतीचीनमायच्छेत् ।

At the place of the tail stretch a purusha towards the west, with the breadth of half a purusha.

That means : construct an oblong, measuring one purusha from the east to the west, half a purusha from the north to the south.

तस्य दक्षिणतोऽन्यमुत्तरतश्च तावच्छया अवशिष्टेऽथार्धपुरोऽप्येवे स्यात् ।

To the south and to the north of this oblong, construct two other oblongs like it, and dividing them by their diagonals remove their halves, so that half a purusha remains as breadth at the jointure of átman and tail.

The result is the form of the tail which we see in the diagram.

शिरस्यर्धपुरुषेण चतुरस्रं कृत्वा पूर्वस्याः करणा अधोनावन्ति दक्षिणोत्तरयोर्निपातायेत् ।

At the place of the head a square is to be made with half a purusha, and from the middle of its east side cords are to be stretched to the middle of the northern and the southern side.

The triangles cut off by these cords are to be taken away from the area of the head.

अप्ययान्प्रति त्रेण्यङ्गमानपच्छिन्द्यात् ।

Then the four corners of the átman are cut off in the direction towards the joining lines. This finishes the measurement of the s'yena. Its four corners are cut off by four cords connecting the ends of the lines in which the átman and the wings touch each other with the ends of the lines in which head and tail are joined to the átman.

A'pastamba now proceeds to the rules for the different sorts of bricks required for the construction of the agni on the agnikshetra.

करणं पुरुषस्य पञ्चमायामङ्ग पृष्ठव्यासं यथायोगनतं तत्प्रथमम् ।

One class of bricks has the length of the fifth of a purusha, the breadth of a sixth, bent in such a way as to fit (the place in which they are to be employed). This is the first class.

By "nata, bent" the sūtrakára means to indicate that the sides of the brick do not form right angles. The shape of the brick is rhomboidical, the angles, which the sides form with each other, are the same which the wings of the s'yena form with the body. (See the diagrams of the two layers of this chiti 11 and 12, in which the bricks are marked with numbers.)

त द्वे प्राचीसङ्घिते तद् द्वितीयम् ।

Two of those bricks joined with their long side form the second class.

These are the bricks used in the second layer at the point where the curvature of the wings takes place.

प्रथमस्य पृष्ठभागमष्टमभागेन वर्धयेदथयोगनतेन तत्तृतीयम् ।

Increase that side of the first description which has the length of the sixth of a purusha, by the eighth part of a purusha which is bent in such a way as to fit in its proper place; this is the third class.

These are the bricks employed in the second layer, at the place where átman and wings join. They consist of two parts; the one part equal to a

brick of the first class lies in the wing; the second part, an oblong of 24 aṅgulis by 15 aṅgulis, lies in the ātman.

चतुर्भागीयाधर्षा तस्याश्चतुर्भागीयामाचमद्वयया भिद्यत्तचतुर्थम् ।

From a brick of which the area exceeds by a half the area of that brick the side of which is the fourth part of a purusha (this latter would be 30 aṅg. by 30 aṅg., the increased brick is 45 aṅg. by 30 aṅg.), and divide that part of it which is equal to the brick, the side of which is equal to the fourth part of a purusha, by its diagonal (removing half of it). This is the fourth class.

We get a trapezium, the sides of which are equal to 15 aṅg., 30 aṅg., 45 aṅg. and, in the language of the sūtras, to the savis'asha of 30 ($= \sqrt{1800}$); they would have put this last side equal to $42\frac{2}{3}$ aṅgulis and very likely have expressed the fraction as 14 tilas.

चतुर्भागीयाधर्ष पञ्चमम् ।

Bricks which are equal to the half of those of which the side is the fourth of a purusha, form the fifth class. Oblongs of 30 aṅg. by 15 aṅg.

तस्याद्वयभागेः षष्ठम् ।

The division of the above bricks by the diagonal produces bricks of the sixth class.

Rectangular triangles (the sides : 30 aṅg., 15 aṅg., $\sqrt{1125}$.)

पुरुषस्य पञ्चमभागं दशभागव्यासं प्रतीचीनमायच्छेत्तस्य दक्षिणतोऽन्यमुत्तरतश्च तावद्वयया दक्षिणापरयोः कोट्यारालिखेत् तत्सप्तमम् ।

Draw an oblong the length of which from the east to the west is the fifth part of a purusha ($= 24$ aṅgulis) and the breadth the tenth part (12 aṅg.); to the north and the south of this oblong draw two other oblongs, and divide those by the diagonals dividing their south-western corners. This is the seventh class.

We get the rhomboidical bricks employed in the second layer on both sides of the tail. Two of their sides are $= 24$ aṅg., the two others $= \sqrt{720}$.

एवमन्यदुत्तरमुत्तरस्याः कोट्या चालिखेत्तदष्टमम् ।

In the same way another description of bricks is formed; only this time the oblong on the north side has to be divided by the (other) diagonal which divides the northern (north-western) corner. This is the eighth class.

Result: the trapeziums employed in the middle of the tail in the second layer.

चतुर्भागीयाद्वयोभयतोभेदो नवमम् ।

The ninth description of bricks is got by dividing a square brick the side of which is equal to the fourth part of a purusha, by both diagonals (into four triangles).

Therewith the dimensions of all required bricks are detailed ; it remains to show how the area of the s'yena is to be covered with them.

उपधाने षष्टिः षष्टिः पक्षयोः प्रथमा उदीचीवपदध्यान् ।

When placing the bricks we have to put down sixty of the first kind in each wing, turned towards the north.

पुच्छपादयोरष्टावष्टौ षष्ठाः ।

On both sides of the tail eight of the sixth description.

तिस्रोऽप्ये तन एकां तनस्त्रिंश तन एकाम् ।

Three of them in the top (*i. e.*, in each of the two western corners of the tail), then one (to the east of the three), then again three, then again one.

पुच्छाप्यये चतुर्थ्या विशये ।

At the place where the tail is joined to the body, two bricks of the fourth description are placed, so as to lie partly in the body, partly in the tail. (They are composed of a triangle and an oblong ; the triangle belongs to the body, the oblong to the tail).

तयोः पश्चात्पश्चम्यावनीकसंक्षिप्ते

To the west of these two, bricks of the fifth kind are placed touching each other with their faces (their short sides).

They touch each other, says one of the commentators, with their faces, like two fighting rams.

शेषे दश चतुर्थ्याः ।

Ten bricks of the fourth kind cover the remainder of the tail.

त्राण्यंसेषु चाष्टौ प्राचीः प्रतीचीश्च ।

In the four corners of the ātman eight bricks of the fourth description are placed, turned towards the east and towards the west.

शेषे च षड्विंशतिरष्टौ पञ्चशतसः पञ्चम्यः ।

In the remainder of the ātman are to be placed twenty-six of the fourth class, eight of the sixth, four of the fifth.

शिरसि चतुर्थ्या विशये ।

In the head two bricks of the fourth kind, situated partly in the ātman.

तयोश्च पुरस्तात्प्राच्यावेव द्विशतः प्रसारः ।

To the east of those, two of the fourth kind turned towards the east. These altogether form one layer of two hundred bricks.

The rules for the second layer follow.

अपरस्मिन्प्रसारे पञ्च पञ्च निर्णामयोर्द्वितीयाः ।

In the second layer place five bricks of the second kind in both wings on the place of curvature.

अथ ययोश्च तृतीया आत्मनसष्टभागोपेताः ।

And bricks of the third kind stretching into the átman with that part, one side of which is an eighth purusha, are to be placed on the two lines in which the wings are joined to the átman.

शेषे पञ्चचत्वारिंशत्प्रथमाः प्राचीः ।

In the remaining part of each wing forty-five bricks of the first class are to be placed, turned towards the east.

Twenty-five in the southern half of the southern wing, twenty in its northern half; twenty-five in the northern half of the northern wing, twenty in its southern half.

पुच्छस्य पार्श्वयोः पञ्च सप्तम्यः ।

Five bricks of the seventh class are to be placed on the northern side of the tail and five on its southern side.

द्वितीयाचतुर्थ्याश्चान्यतरतः प्रतिसंख्यितामेकैकाम् ।

At the side of the second (of the above mentioned bricks) on one side (of the tail), and at the side of the fourth on the other side, one brick of the seventh class is to be placed.

शेषे त्रयोदशाष्टम्यः ।

In the remaining part of the tail thirteen bricks of the eighth class are to be placed.

श्रेण्णस्य चारौ चतुर्थ्या दक्षिणा उदीचीय ।

In the four corners of the átman place eight bricks of the fourth kind, turned towards the south and the north.

शेषे च विंशतिस्त्रिंशत्पञ्च एका पञ्चमी ।

In the remaining part of the átman twenty bricks of the fourth kind, thirty of the sixth and one of the fifth, are to be placed.

शिरसि चतुर्थ्या तयोश्च पुरस्ताच्चतस्रो नवम्यः ।

Two of the fourth kind are to be placed in the head, and to the east of those four of the ninth kind.

एष द्विशतः प्रस्तारः ।

This gives again a layer of two hundred bricks.

आन्यासं चिनुयाद्यावतः प्रस्तारांश्चिकीर्षेत् ।

By turns the layers are to be constructed as many as we may wish to make.

The third layer is equal to the first, the fourth to the second, the fifth again to the first, and so on.

Next I extract from the third paṭala of Baudháyana's *S'ulva-sūtra* the rules for the construction of the sárarathachakrachit, the altar shaped like a wheel with spokes. *Vide* Diagrams 13, 14, 15.

पुष्यार्धोत्पन्नाद्दशनेष्टकाः समचतुरस्राः कारयेन्मानायाः ।

With the fifteenth part of half a purusha square bricks are made ; they are used for measuring (only for the measurement of the area of the sārathachakrahit, not for the construction of the agni).

A square is made equal to half a square purusha and its fifteenth part taken ; then bricks are made, equal to this fifteenth part.

तासां द्वे शते पञ्चविंशतिश्च सारत्विज्रादेशः सप्तविधः सम्पद्यते ।

Two hundred and twenty-five of these bricks constitute the sevenfold agni together with aratni and prādes'a.

The sevenfold agni with aratni and prādes'a means, as mentioned above, the agni the area of which is equal to seven and a half square purushas. As fifteen of the bricks mentioned in the first sūtra make half a square purusha, seven and a half purushas require two hundred and twenty-five.

तास्यन्याश्चतुःषष्टिमावपेत् ।

To these (two hundred and twenty-five bricks) sixty-four more are to be added.

We get thereby altogether two hundred and eighty-nine bricks.

ताभिः चतुरस्रं करोति ।

With these bricks a square is to be formed.

तस्य षोडशेष्टका पार्श्वमानी भवति ।

The side of the square comprises sixteen bricks.

अथत्विंशतिश्चतुर्षष्टिमावपेत् ।

Thirty-three bricks still remain.

ताभिरन्तात्सर्वतः परिचिनुयात् ।

These are to be placed on all sides round the borders (of the square ; *i. e.*, according to the commentary, on the north side and east side of the square).

Thereby all 289 bricks are arranged in a square, the side of which is formed by seventeen bricks. It is strange that we are not directed to construct the whole square at once, but are told to form at first a square out of 256 bricks and then to place the remaining 33 bricks around it. I have to propose only the following explanation. The commentator describing the whole procedure tells us to form at first in the middle of the agnikshetra a small square with four bricks, then to increase this square into a larger one, of nine bricks, by adding five bricks, to increase this square in its turn into a larger one of sixteen, and so on. While we place the additional bricks by turns on the north and east side and on the south and west side of the initial square of four bricks, the growing square loses and regains by turns its situation right in the centre of the agnikshetra ; it loses it when it is increased for the first time, regains it when increased for the second time,

loses it again when increased for the third time, and so on. When it is increased for the fourteenth time or, to put it in another way, when 256 bricks have been laid down, the centre of the square coincides again with the centre of the agnikshetra, and it is again displaced from there when thirty-three bricks more are added on the north and east side, and the whole square is composed of 289 bricks. The whole agni was therefore slightly displaced, and for this reason perhaps Baudháyana preferred not to call it a real chaturas'ra, but a figure made out of a chaturasra of 256 bricks with the addition of 33 bricks. There is reason for wonder that the displacement of the agni was not remedied in some way; it would have been a very easy matter.

नाभिः षोडश सध्याः ।

The sixteen middle bricks form the nave of the wheel.

We must remember that the bricks mentioned here are only used for measuring out the agnikshetra, and consequently understand by the sixteen middle bricks the area covered by them. In order to cut a square of the required size out of the centre of the large square, the commentator directs us to fix poles in the centre of the four bricks forming the corners of the square of twenty-five bricks situated in the middle of the large square and to join these four poles by cords; the area included by these cords is equal to that of sixteen bricks.

चतुःषष्टिरराचतुःषष्टिर्वेदिः ।

Sixty-four bricks form the spokes of the wheel, sixty-four the vedi.

Out of the entire square of 289 bricks another square has to be cut out, containing the area for the spokes and for the void spaces between the spokes. This square would be equal to the area occupied by 144 bricks, but we have to deduct from that the 16 bricks in the centre which constitute the nave. Thus 128 bricks are divided equally between spokes and interstices. The required square is cut out by poles being fixed in the centre of the four bricks which form the corners of the square of 13×13 bricks and by joining the four poles with cords.

नेमिः शेषाः ।

The remaining bricks form the fellow of the wheel.—One hundred and forty-four bricks having been employed for nave and spokes, one hundred and forty-five remain for the fellow. The measurement of the agnikshetra being finished therewith, the bricks used for measuring are no longer wanted. As result of the described proceeding we have three squares, the largest of which encloses the two smaller ones. The smallest, situated in the centre, is meant for the nave; the two larger ones mark the interior and exterior edges of the fellow. It remains to turn these three squares into circles.

नाभिमन्तः परिलिखेत्

The nave is to be circumscribed at its borders with a circle, *i. e.* the square forming the nave is to be turned into a circle. This was of course executed according to the general rule which has been discussed above.

नेमिमन्ततयान्तरतय परिहृष्य ।

After having likewise turned into circles the squares, marking the outer and inner edge of the felloe—

नेमिनाभोरन्तरालं द्वाविंशत्या विभज्य विषयांसं भागानुदरेत् ।

One divides the area lying between felloe and nave into thirty-two parts, and takes out the second, fourth, sixth, &c., parts.

That means: the second, &c., parts are excluded from the agnikshetra and not to be covered with bricks.

एवमावाप उद्धृता भवन्ति ।

In this manner the added part (*i. e.*, the sixty-four bricks by which the square of 289 bricks exceeded the legitimate area of the saptavidha agni) is removed again.

By following all the preceding directions we get indeed a wheel, the area of which (with exclusion of the interstices between the spokes) is equal to that of the saptavidha agni; of course, we have to make the necessary allowance for the inevitable error introduced by the square having to be turned into a circle. It remains to retrace the steps by which Baudhāyana succeeded in rendering the area of the sārathachakra pretty well equal to that of the chaturasra s'yena.

A look at the diagram of the sārathachakrachit shows at once that one preliminary question must first be settled, the question what the relative size of the wheel's different parts was to be. As far as we can see, there was no fixed rule regarding this matter, and wheels of various shapes might therefore have been adopted. Baudhāyana does not state at the outset what the shape of his wheel will be, but from the result of his rules we may conclude his intention. The entire square—or the entire circle into which the square is turned—comprises 289 bricks, or simpler 289 parts, of which 145 form the felloe, the remaining 144 the spokes, interstices, and the nave. It appears therefore probable that Baudhāyana's intention was to allot to the felloe an area equal to that of spokes, &c., together. The reason why the two parts were not made exactly equal will appear from the following.

The task was, in the first place, to draw two squares—representing the outer and the inner edge of the felloe—the area of one of which was the double of the area of the other. For this purpose Baudhāyana made use of his "savis'esha," *i. e.*, of the rule teaching that the square of $16\frac{3}{4}$ is almost equal to double the square of 12; only he substituted here, in order to facilitate the operation, 17 to $16\frac{3}{4}$. Accordingly, he began by drawing a square the area of which amounted to seven and a half square purushas,

divided it into 289 parts, by dividing its side into 17 parts, and drew in the centre of this square another one comprising 144 such parts (by the method described above). To these two squares representing the outer and inner edges of the fellow a third one, marking the area of the nave, had to be added. For this purpose from the square of 144 parts a small square of 16 parts, amounting to the eighth part of the whole, was cut out. Lastly, of the 128 parts left for the space between nave and fellow, 64 were removed, so that 64 were left for the sixteen spokes.

Now by removing 64 parts, the agnikshetra was unduly reduced; it had to contain 289 parts, and it only contained 225. This deficiency had of course to be made up in some way, and the way how to do that was not very difficult to find. Sixty-four of two hundred and eighty-nine parts were lost in the act of cutting out the interstices of the spokes, therefore the area of the initial square had to be such that it would be equal to $7\frac{1}{2}$ square purushas after having been diminished by $\frac{64}{289}$. Accordingly, the square equal to $7\frac{1}{2}$ purushas had not to be divided into 289 parts, but into 225 parts, and 64 parts had to be added moreover, so that the loss of these 64 parts reduced the agnikshetra just to the right size.

Hence Baudhāyana's rules to make bricks equal to the two hundred and twenty-fifth part of the agni, to add sixty-four such bricks, &c.

The rules now following teach how to cover the kshetra of the sārathachakra with two hundred bricks.

नेमिं चतुःषष्टिं कृत्वा व्यवलिष्य मध्ये परिकल्पेत् ।

Having divided the fellow into sixty-four parts and having drawn the separating lines, a circle is to be described in the middle (of the fellow).

ता अष्टादशतिशतं भवन्ति ।

Thus we get one hundred and twenty-eight (bricks placed in the fellow).

अष्टादशतुधा विभजेत् ।

Every spoke is to be divided into four parts. We get therefore sixty-four bricks in all spokes together.

नाभिमष्टधा विभजेत् ।

The nave is to be divided into eight parts (by radii).

एष प्रथमः प्रस्तारः ।

This is the first layer.

Again, in order to avoid the "bheda", a different division of the agnikshetra had to be adopted for the second layer.

अपरस्मिन्प्रस्तारे नाभिमन्तश्चतुर्थवेलायां परिकल्पेत् ।

In the second layer a circle is to be described in the nave at the distance of a quarter from the edge.

नेमिमन्तरतः ।

In the same manner a circle is to be described in the fellow at the distance of a quarter from its inner edge.

नेमिमन्तरतश्चतुःषष्टिं कृत्वा व्यवलिखेत् ।

After having divided the fellow at its inner edge into sixty-four parts, draw the dividing lines.

अराणां पञ्चधा विभाग आपरिकर्षणयोः ।

The spokes are divided into five parts, each up to the two circles (in nemi and nábhi). That means : the area of a spoke is considered to extend into the fellow and the nave up to the two circles which had been drawn in them at the distance of a quarter from the edge, and this whole area is divided into five parts.

नेम्यामन्तरालेषु द्वे द्वे ।

Two bricks are placed in each of the interstices in the nemi (the interstices between the spokes).

नाभ्यन्तरालेष्वेकैकाम् ।

And one brick in the interstices in the nave.

यच्छेषं नाभेस्तदष्टधा विभजेत् ।

The remainder of the nave is to be divided into eight parts.

स एव षोडशकरणः सारो रथचक्रचिन् ।

This is the construction in the shape of a wheel with spokes, which requires altogether sixteen different kinds of bricks.

As remarked above, the third and fifth layers are to be made equal to the first, the fourth to the second.

I lastly extract the chapter treating of the *s'mas'ánachiti*. It is not easy to say what would be the correct definition of a *s'mas'ána* in the sense in which it is used in the *s'ulvasútra* ; it seems to be a construction on which the dead body was placed, perhaps the pile on which it was burnt. There is, however, no doubt about the form of the *chiti*, which will appear clear enough from the diagram. *Vide* Diagrams 16, 17, 18.

अग्निमन्त्रं चिन्वीतेति विज्ञायते । सर्वमग्निं चतुरस्रान्पञ्चदशभागान्कृत्वा ॥

"He may construct the *s'mas'ánachiti*", such is the tradition. Having divided the whole agni into fifteen squares.

The area of the agni, $7\frac{1}{2} = \frac{15}{2}$ square purushas, divided in this manner, yields fifteen squares, of one half square purusha each.

तेषामाख्यातमुपधानम् ।

The arrangement of these fifteen squares has already been taught.

As the commentator explains, the subject has been treated in a previous portion of Baudháyana's *kalpasútra*, from which he quotes the following :

अग्निमन्त्रं चिन्वीत यः कामयेत पिबल्लोकं च्छुयामिति षट्पञ्चः पुरुषान्नयः पुरुषान्तिर्यङ्चौ तौ द्वौ स चाग्ना ।

He who wishes for prosperity in the world of the fathers, may construct the *s'mas'ánachiti*. Six purushas are the length of the *práchi* line, three the length of the eastern side, two the length of the western side.

Purusha means here not the ordinary purusha, but the measure of the side of one of the fifteen squares into which the agni has been divided. The form of the chiti is that of a trapezium (as the sūtras would call it: an oblong shorter on one side), the east side of which is equal to three reduced purushas, &c.

The area of this trapezium is consequently equal to $7\frac{1}{2}$ square purushas.

This area has now to be divided into two hundred parts.

त्रिभिर्भागैर्भागार्धव्यासं दीर्घचतुरस्रं विहृत्य पूर्वस्यः करणा अर्धाच्छोणी प्रत्यालिख्यान्नावुद्धरेत् ।

With three of these parts construct an oblong of the breadth of one part (an oblong of which one side is equal to three times the side of one of the fifteen squares, and the other equal to one time the side), draw from the middle of the east side of this oblong lines to the two west corners, and cut off the two side pieces.

After the removal of these two pieces, there remains a praūga, an acut-angular equilateral triangle.

तस्य दशधा विभागः ।

This triangle is divided into ten parts.

For the details of this division, we must consult the commentator:

तस्य प्रउगस्य प्रउगाकारा उभयतःप्रउगाकारा इष्टका यथा भवन्ति तथा दशधा विभागः । अन्यथाविभागे करणवज्रत्वं स्यात् । तत्रैवं विभागः । प्रउगश्च्यनीके समान्तराणि त्रीणि चिह्नानि कृत्वा चतुरो विभागान्कृत्वा प्रउगपार्श्वयोरपि तथा कृत्वा श्य्वनीकप्रथमचिह्नादारभ्येतरपार्श्वप्रथमचिह्नं प्रत्यालिखेत् । एवं द्वितीयचिह्नादारभ्य पार्श्वद्वितीयम् । एवं तृतीयचिह्नादारभ्य तथा तृतीयम् । तथा तृतीयचिह्नादारभ्य इतरपार्श्वप्रथमचिह्नं प्रत्यालिखेत् । एवमितरयोः । एवं विभक्ते श्य्वनीकस्थाः प्रउगाकाराश्चतस्र इष्टकाः । ततस्त्रिष उभयतःप्रउगाकृतयः । ततो द्वे । तत एका चुबुकान्ता । एवं षडुभयतःप्रउगाश्चतस्रः प्रउगाः । एवं दशेष्टकैकस्मिन्प्रउगे भवन्ति ।

The division of this triangle is to be made in such a way as to produce bricks of the shape of triangles and double triangles (two triangles joined with their bases). If we adopted another division, we should get different classes of bricks. (The sūtras always study the greatest shortness in their expressions and say in this case only: the division is into ten parts. Now, the commentator remarks, this can only mean: into ten triangles and double triangles; for if we divide the large triangle in any other manner, the eight parts would be of different shape, and then the sūtrakāra would have been bound to give rules for manufacturing bricks of these different shapes). The division of the triangle is effected in the following manner. We make on the "broad face", *i. e.*, the base of the triangle (the sūtrakāras compare the triangle with a face, the base—we have to imagine the

triangle turned round, so that the base is uppermost—representing the broad *i. e.*, upper part and the top the chin, *chubuka*) three marks at equal distances from each other (thus dividing it into four parts). Having divided the two other sides of the triangle in the same way, we begin by drawing a line from the first mark on the base to the first mark on the nearer of the two other sides. Then a line is drawn joining the second mark on the base with the second mark on the side, and a third line joining the third mark on the base with the third mark on the side. After that, a line is drawn joining the third mark on the base with the first mark on the third side of the triangle. The same is done with the other marks. By this division we get four triangular bricks standing on the base of the large triangle; over these we have three double-triangular bricks; then two double-triangles; then one double triangle in the 'chin' of the large triangle. Altogether six double triangles and four triangles. Thus we have ten bricks in one of the large triangles.

तानि विंशतिः सर्वेऽग्निः संपद्यते ।

Twenty such (large triangles as described in the last *sūtra* but one) form the whole agni.

One of these triangles is the half of an oblong, the area of which is equal to the tenth part of the whole agni.

The arrangement of these twenty large triangles, every one of which is subdivided into ten *praūgas* and *ubhayatahpraūgas*, may be seen in the sketch of the first layer of the *s'mas'ānachiti*, and I omit therefore the detailed description given by the commentator.

Baudhāyana proceeds to the rules for the second layer.

अपरस्मिन्प्रकारे प्रउगं मध्येनूचीनं विभजेत् ।

For the second layer we divide one triangle lengthways (bisecting the base by a perpendicular from the top).

Here again we depend on the commentary for explanation.

अग्निश्चेवे भागप्रमाणव्याप्तानि षड्भागप्रमाणाद्यतानि पञ्च महाप्रउगानि शेरते ।

तत्र प्रत्यगद्याणि त्रीणि प्राग्ये द्वे । तेषां महाप्रउगानां प्रउगद्वयमिह विवक्षितम् । अनूचीनमिति प्रउगविशेषणम् । षड्भागायतमित्यर्थः । दक्षिणतः प्रत्यगप्रस्थितप्रउगमध्ये भागप्रमाणष्टवनीकमध्यादारभ्यापश्चिमसूत्रापादालिखेत् । एवमुत्तरस्मिन्नपि पार्श्वे स्थितं विभजेत् ।

In the whole *agnikshetra* (of the *s'mas'ānachiti*) there are five triangles, the height of which is equal to the measure of six parts (to six times the side of the fifteenth part of the *agnikshetra*), and the base of which is equal to one such part (the area of one such triangle is $\frac{1}{15}$ of the *agnikshetra*, therefore all five = the whole *agnikshetra*, $7\frac{1}{2}$ square *purushas*). (If we divide the agni into these five triangles), the top of three among them is

turned towards the west, that of two towards the east. Two of these five triangles are meant in the sūtra (only two come really into question, as we shall see further on). By "lengthways" a modification of the triangle is to be understood; the meaning is a triangle of six parts' height. (And this triangle is to be got in the following way). On the south side of the agni a line is to be drawn through the middle of the triangle situated there, the top of which is turned towards the west; this line reaches from the middle of the base the measure of which is one part to the top of the triangle. In the same way the triangle on the north side of the agni is to be divided.

The result is the two long rectangular triangles on the north and south sides of the second layer of the s'mas'ânachiti.

तस्य षडधा विभागः ।

This triangle is divided into six parts.

Commentary : प्रत्यग्र षड्भागायतं महाप्रउगार्धं तिर्यक् विधा विभजेत् । तत्र पूर्वखण्डस्य पूर्वतिर्यङ्मान्यां समान्तराले द्वे चिह्ने कृत्वा प्रथमचिह्नादारभ्यार्जवेनापरतिर्यङ्मान्यां प्रत्यालिखेत् । एवं द्वितीयचिह्नादारभ्य । एवं मध्यमखण्डस्य पूर्वान्तमध्यादारभ्यार्जवेनापरान्तालिखेत् । एवं विभक्ते प्रथमे खण्डे बाह्यपार्श्वतः अधप्रउगाकारा एकेष्टका । मध्यतो द्वे दीर्घचतुरस्रे । मध्यमखण्डस्य बाह्यत एका प्रउगार्धा अन्तरत एका दीर्घचतुरस्रः । अपरो भागः प्रउगार्धरूप एव । एवं षडधा विभागः । एवमुत्तरतः ।

The diagram of the second layer, in which the two triangles are divided in the manner described above, renders a translation of the commentator's words unnecessary.

ते द्वे पार्श्वयोः षडध्यात ।

These two (large triangles, divided into six parts each) are to be placed on both sides (of the second layer).

In the following sūtras those bricks are described which fill the space between the two triangles.

भागद्वितीयाद्यामाश्चतुर्थ्यामाः कारयेत् ।

Bricks are to be made as long as the third part (of the side of one of the fifteen squares which compose the agnikshetra), and as broad as the fourth part.

तामामर्ध्यालिर्यग्भेदाः ।

And other bricks equal to one half of the bricks of the first class, produced by dividing the latter by a horizontal line.

ता अन्तयोः पश्चात् शेषमग्निं वृद्धीभिः प्राचीभिः प्रच्छादयेत् ।

Having put bricks of the second class on the east and west end of the agni, the remaining space is to be covered with the large bricks of the first description.

Covering the agni as directed, we place at first eight ardhya bricks on the east end and eight on the west end. The space left empty between

these two rows requires $17 \times 8 = 136$ brihatī bricks. Now, summing up all bricks employed we get (1) 136 brihatyas (2) 16 ardhyās (3) twelve bricks in the two triangles on the north and south side together. Sum : 164 bricks.

But we want, according to the general rule, 200 bricks, and therefore the following sūtra.

अर्धेष्टकाभिः सङ्ख्यां पूरयेत् ।

Finally the number is to be made full with ardhya-bricks.

That means : thirty-six brihatyas are taken out, and seventy-two ardhyās put in their places. The sketch of the layer in question shows where this had to be done.

So far the rules for the s'mas'ānachiti resemble those for the other chitis, but the following sūtras refer to an interesting peculiarity. I give at first a passage from a previous part of Baudhāyana's Kalpasūtra, quoted by the commentator.

तस्य मात्रा यदि धीवदघ्नं पुरस्ताद्गामिदघ्नं पश्चात् । यदि नाभिदघ्नं पुरस्ताज्जानु—
दघ्नं पश्चात् । यदि जानुदघ्नं पुरस्ताद्गुहफदघ्नं पश्चात् । यदि गुहफदघ्नं पुरस्तात्समं भूमिः
पश्चात् । स एव यज्ञशानचिपिडलोककामस्येति ।

When its measure is such as to reach up to the neck on the east side, it reaches up to the navel on the west side ; when it reaches up to the navel on the east side, it reaches up to the knee on the west side ; when it reaches up to the knee on the east side, it reaches up to the ankle on the west side ; when it reaches up to the ankle on the east side, it is on a level with the ground on the west side. Such is the s'mas'ānachiti of him who desires the world of the fathers.

We see from these words that, contrary to the general rule which prescribed a perfectly horizontal surface for the chitis, the s'mas'ānachit had to be higher at its east end than at its west end. The commentator adds : hastiprishṭhavach chinviteti : the chiti is to be constructed so as to resemble the back of an elephant which is sloping down towards a person viewing the animal from behind. This peculiar shape of the s'mas'ānachiti required consequently a set of rules for preserving, notwithstanding the different height, the same cubic content of the whole mass of bricks.

ऊर्ध्वप्रमाणमग्नेः पञ्चमेन वर्धयेत् ।

The height of the agni is to be increased by one fifth.

The height of the agni, when constructed for the first time and in five layers, is—as mentioned above—one jānu = 32 aṅgulis ; when constructed for the second time and in ten layers, it is the double, and it is three times as much when, in the third construction, the number of layers amounts to fifteen. A fifth of the usual height has to be added to the height of the s'mas'ānachiti.

तत्सर्वं चेधा विभज्य द्वयोर्भागयोश्चतुर्थेन नवमेन वा चतुर्दशेन वेष्टकाः कारयेत् ।

Divide all this—the height inclusive the added fifth part—into three parts, and make bricks with the fourth or the ninth or the fourteenth part of two of these three parts.

With the fourth for the agni of five layers, with the ninth for the agni das'achitika, with the fifteenth for the panchadas'achitika.

ताभिश्चतस्रो वा नव वा चतुर्दश वा चितीरुपधाय शेषमवाचमद्वययापञ्चिन्द्यादर्धमुद्धरेत् ।

Having constructed with these bricks either four or nine or fifteen layers, the remaining part of the height (amounting to one third) is to be divided in a downward direction by the diagonal and half of it to be removed.

That means : the fifth layer is to be constructed with bricks the height of which is equal to the third part of the whole height ; and then half of the whole layer is to be cut off following the direction of the diagonal of the northern and southern side. In this way the cubic content of the whole chiti comes out right. Increasing the height of the agni of five layers by its fifth part, we get $32 + 6\frac{2}{3} = 38\frac{2}{3}$ aṅgulis. This divided by three and the quotient multiplied by two, gives $25\frac{1}{3}$. The fourth part of this, $6\frac{2}{3}$ aṅgulis is the height of the bricks of each of the four first layers. The fifth layer, before being cut in two, is $12\frac{1}{2}$ aṅgulis high ; after the removal of its half, it has this height only on its east side, the height on the west side being equal to 0. Thus its middle height is $6\frac{2}{3}$, and consequently the middle height of the whole chiti = 32 aṅgulis. In the same way we get as height of the agni of ten layers $76\frac{1}{2}$ aṅgulis on the east side, $51\frac{1}{2}$ on the west side, 64 aṅgulis as middle height. The corresponding numbers for the panchadas'achitika agni are $115\frac{1}{2}$, $76\frac{1}{2}$, 96.

Regarding the time in which the *S'ulvasūtras* may have been composed, it is impossible to give more accurate information than we are able to give about the date of the *Kalpasūtras*. But whatever the period may have been during which *Kalpasūtras* and *S'ulvasūtras* were composed in the form we have now before us, we must keep in view that they only give a systematically arranged description of sacrificial rites, which had been practised during long preceding ages. The rules for the size of the various vedis, for the primitive shape and the variations of the agni, &c., are given by the brāhmaṇas, although we cannot expect from this class of writings explanations of the manner in which the manifold measurements and transformations had to be managed. Many of the rules, which we find now in *Baudhāyana*, *A'pastamba*, and *Katyāyana*, expressed in the same or almost the same words, must have formed the common property of all adhvaryus

long before they were embodied in the Kalpasūtras which have come down to us. Besides, the quaint and clumsy terminology often employed for the expression of very simple operations—for instance in the rules for the addition and subtraction of squares—is another proof for the high antiquity of these rules of the cord, and separates them by a wide gulf from the products of later Indian science with their abstract and refined terms.

This leads to another consideration. Clumsy and ungainly as these old sūtras undoubtedly are, they have at least the advantage of dealing with geometrical operations in really geometrical terms, and are in this point superior to the treatment of geometrical questions which we find in the Līlāvati and similar works. They tell us that the diagonal of a square or of an oblong produces an area equal to double the area of the square or to the squares of the sides of the oblong—not that the square of the number of units into which the diagonal is divided is equal to double the square of the number expressing the side of the square or to the sum of the squares of the two numbers which represent the sides of the oblong.

Let us see how Bhāskara words the proposition about the rectangular triangle (instead of which the sūtras speak of the square and the oblong). We read in the chapter on kshetravyavahāra in the Līlāvati the following :

— तत्त्रत्योर्गोपदं कर्णः ।

The square root of the sum of the squares of these (of the two shorter sides of a rectangular triangle) is the diagonal.

दोःकर्णवर्गयोर्विवरान्मूलं कोटिः ।

The square root of the difference of the squares of the diagonal and one of the short sides (called "doh") is the other short side (kotih), etc.

It is apparent that these rules are expressed with a view to calculation, and we find indeed that Bhāskara immediately proceeds to examples which are exercises in arithmetic, not in geometry.

कोटिश्चतुष्टयं यव दोस्तय यव का द्युतिः ।

कोटिं दोः कर्णतः कोटिद्युतिभ्यां च भुजं वद ॥

A geometrical truth interests the later Indian mathematicians but in so far as it furnishes them with convenient examples for their arithmetical and algebraic rules; purely geometrical constructions, as the samāsa and nirhāra of squares, described in the S'ulvasūtras, find no place in their writings.

It is true that the exclusively practical purpose of the S'ulvasūtras necessitated in some way the employment of practical, that means in this case, geometrical terms, and it might be said that the later mathematicians would have employed the same methods when they had had to deal with the same questions.

But a striking proof of the contrary is given by the commentators of the *S'ulvasūtras* who represent the later development of Indian mathematics. Trustworthy guides as they are in the greater number of cases, their tendency of sacrificing geometrical construction to numerical calculation, their excessive fondness, as it might be styled, of doing sums renders them sometimes entirely misleading. I shall illustrate this by some examples.

As mentioned above, the area of the *saptavidha agni* had, at each repetition of the construction of the altar, to be increased by one square *purusha*. In order to effect this increase, without changing the proportion of the single parts of the *agni*, *Baudhāyana* gives the following rule :

That which is different from the original form of the *agni* (*i. e.*, that area which has to be added to the $7\frac{1}{2}$ square *purushas* of the primitive *agni*) is to be divided into fifteen parts, and two of these parts are to be added to every one of the seven square *purushas* of the primitive *agni* (the one remaining part is consequently added to the remaining half *purusha*) ; with seven and a half of these increased *purushas*, the *agni* has to be constructed.

According to the commentator, we have to apply this rule in the following fashion. The one square *purusha*, which has to be added to the *saptavidha agni*, contains 14400 square *aṅgulis*. We divide 14400 by fifteen, multiply the quotient by two, and add the product to 14400 : result = 16320. These 16320 *aṅgulis* are the square content of the new increased square *purusha*, and we have therefore, in order to get the required measure of length, to extract the square root of 16320. This root indicates the length which had to be given to the cane used for measuring out the *asṭavidha agni*.

Such a proceeding is of course not countenanced by the rules of the *S'ulvasūtras* themselves. *Baudhāyana's* method was undoubtedly the following. The square *purusha* which had to be added was divided into fifteen parts, either into fifteen small oblongs, by dividing one side of the square into three, the other into five parts or into fifteen small squares ; in the latter case, the *panchadas'amakaraṇi* had to be found according to the *paribhāsha* rules. Two of these fifteenth parts were then combined into one ; if squares, by taking the *dvikaraṇi* of one of them ; if oblongs, by turning one of them into a square and then taking the *dvikaraṇi*. Lastly—following the rules for *chaturasra-samāsa*—the square containing the two fifteenth parts was added to a square *purusha*, and the side of the resulting square furnished the measure of the *purusha* which had to be employed for the *asṭavidha agni*.

Another example is furnished by the rules for the *paitrikī vedi*, the altar used at the *pitṛiyajna*, the area of which had to be equal to the ninth part of the *vedi* used at the *soma* sacrifices. The measures of the sides of this *vedi* have been mentioned above ; its area amounts to 972 square *padas*.

Now for constructing the paitrikī vedi from the saumikī vedi, Baudhāyana gives the following short rule :

महावेदसूतीयेन समचतुरस्रकृतायास्तृतीयकरणीति नवमस्तु भूमेर्भागो भवति ।

The commentator, supplying several words, explains this sūtra in the following way : If we make a square, the area of which is equal to 972 square padas, its side will be equal to 31 padas, 2 añgulis, and 26 tilas. The third part of this (= 10 padas, 5 añgulis, and 31 tilas) is to be taken for the side of a square, the area of which will be equal to the ninth part of the mahāvedi.

For a proof we are directed to turn the 972 square padas into square tilas by multiplying 972 by 225 and then by 1056, to extract the square-root of the result, to turn the tilas again into padas by dividing the square-root by 34 and then by fifteen, and finally to divide the result by three.

In accordance with this process, the commentator translates the above sūtra in the following manner :

The side ("karani" to be supplied) of that area ("bhūmeh" to be supplied) which is made a square with the third part of the mahāvedi (which has been itself turned into a square previously) is the tritīyakarani; the ninth part (of the mahāvedi) is produced (by making a square with this tritīyakarani).—This translation is certainly wrong. In the first place, the word 'karani', which the commentator supplies, could not be missed in the text of the sūtra. In the second place, the commentator ascribes to the word 'tritīyakarani' a meaning which it cannot possibly have. He interprets it as the line which is the third part (of the side of the mahāvedi); but that line is called the navamakarani, as its square is equal to the ninth part of the area of the mahāvedi, and tritīyakarani can only mean the line which produces, or the square of which is the third part (of some area).

To arrive at the right understanding of the sūtra, we must consider by what method the task of constructing the paitrikī vedi could be accomplished in the shortest way. The thing was to construct a square, the area of which would be equal to the ninth part of another area which contained 972 square padas, *i. e.*, to 108 square padas. If 108 would yield an integral square-root, the matter would have been easy enough; but this not being the case, another method had to be devised. The commentator, as we have seen, proposes to construct a square of 972 padas, and to take the third part of its side; but this method besides, as shown above, not agreeing with the words of the sūtra, required several tedious preparatory constructions. The same remark applies to the direct construction of a square of 108 padas, and a shorter process could therefore not but be highly welcome. Now the third part of 972 is 324, and the square-root of 324 is exactly 18; in other words, the side of a square of 324 square padas is eighteen padas. Accordingly, instead of the navamakarani of 972, the tritīyakarani of 324 was

sought for, and we know from the *paribhāsha* rules that this could be easily managed. Accordingly, Baudhāyana's rule has to be translated as follows: The *tritiyakaraṇī* of that area which is made a square with the third part of the *mahāvedi* (*i. e.*, of a square of 324 padas) is it (*viz.* the side of a square of 108 padas); the result is the ninth part of the area (of the *mahāvedi*).

Thus we see that the pre-conceived opinion of the commentator about the method to be employed for the solution of the problem leads him to a perfectly mistaken interpretation of the *sūtra*.

On the other hand, it is interesting to find some terms indicating a connexion between the first rudiments of science as contained in the *S'ulvasūtras* and its later development. So for instance the term 'varga'. It is true that we should be able to account for the meaning in which it is used by later mathematicians—*viz.* that of the square of a number—without finding earlier indications of the manner how it came to be used in that sense. The origin of the term is clearly to be sought for in the graphical representation of a square, which was divided in as many 'vargas', or troops of small squares, as the side contained units of some measure. So the square drawn with a side of five padas' length could be divided into five vargas, each consisting of five small squares, the side of which was one pada long.

Nevertheless it is interesting to find this explanation of *varga* confirmed by a passage in *A'pastamba*.

यावत्प्रमाणं रज्जुस्रावतस्त्रावतो वर्गान्करोति ।

As many measures (units of some measure) a cord contains, so many troops or rows (of small squares) it produces (when a square is drawn on it).

But another case is more interesting still. The word '*karaṇī*' is one of the most frequent mathematical terms in treatises as the *Līlāvati*, *Vijaganita*, &c., and there it is invariably used to denote a surd or irrational number; as the commentators explain it, that of which when the square-root is to be taken, the root does not come out exact. The square-roots of two, three, five, &c., are *karaṇīs*. How the word came by that meaning, we are not told, but we are now able to explain it from the *S'ulvasūtras*. As we have seen above, in these it always means the side of a square.

The connexion between the original and the derived meaning is clear enough. *Karaṇī* meant at first the side of any square, after that possibly the square-root of any number. Possibly I say, for in reality the mathematical meaning of *karaṇī* was restricted. It was not used to denote the square-roots of those numbers, the root of which can be exactly obtained, but only of those the root of which does not come out exact, of those in fact the root of which can be represented exactly only in a graphical way. It was not possible to find the exact square-root of eight for instance, but it

was possible to draw a square, the area of which was equal to eight—let us say—square padas, and the side of which was therefore a graphical representation of the square-root of eight.

But we have to go still a step further back. 'Karani' meant originally not the side of a square, but the rajjuh karani, the cord used for the measuring of a square. And thus we see that the same word which expressed in later times the highly abstract idea of the surd number, originally denoted a cord made of reeds which the adhvaryu stretched out between two wooden poles when he wanted to please the Immortals by the perfectly symmetrical shape of their altar.

Contributions to the History and Geography of Bengal (Muhammadan Period). No. III.—By H. BLOCHMANN, M. A., *Calcutta Madrasah*.

(With a plate.)

Major Raverty's copiously annotated translation of the *Tabaqât i Ná-giri* furnishes in its chapters on the Mu'izzî Sultáns of Bengal a few items of local interest and raises some points for discussion. First of all, as far as chronology is concerned, the necessity of dating back a few years the conquest of Bengal by Muhammad Bakhtiyár Khiljî* has become clear. Major Raverty fixes upon the year 589 H., or A. D. 1193, as the year when Qutbuddín established himself in Dihlí. Several sources give 588; some give 587, or 1191 A. D., which last date Mr. E. Thomas looks upon as "consistent with the best authorities." The conquest of Bengal, again, is referred by Major Raverty to the year 590 H. (A. D. 1194), or one year after the occupation of Dihlí as computed by him. A MS. history of Gaur, made by Munshí Syám Prasád for Major Franklin, appears also to fix upon 590 as the year in which Bengal was conquered, because it states that the life and the reign of Lakshman Sen extended from 510 to 590. Mr. Tho-

* The *Burhán i Qáfí* gives the spelling 'Khalaj', and the Tahrán edition of the Farhang gives "Khalaj, a tribe in the desert near Sáwah." Major Raverty writes 'Khalj', and thus follows the older Indian dictionaries as the Ibráhmí, Kashful-lughát, and Madáru-l-afázil; but the common Indian pronunciation of the adjective, whether right or wrong, is Khiljî. The coins of the Málwá kings, on which 'Khiljî' is made to rhyme with 'multajî', favour the pronunciation 'Khalajî'. But in forming adjectives of proper nouns, vowels are often changed. Thus in Arabic 'Biçrî' from 'Baçrah'. Or forms are shortened, as 'Káshí' from 'Káshán'. Hence 'Khiljî' from 'Khalaj' or 'Khalj' would not be unusual. That 'Khiljî', with an i, is old, may be seen from the pronunciation of the towns of Khiljipúr, of which one belongs to Sárangpúr, the other to Rantanbhár.

mas refers the conquest of Bengal to the year 599 H., or A. D. 1202-3, his authority being, I believe, the *Tāj ul-Maāshir*, which states that the fort of Kálinjar was conquered by Quṭbuddín in 599, and that he afterwards went to the neighbouring Mahobá, where Muhammad Bakhtyár paid his respects and offered presents from the Bengal spoils. Major Raverty disposes of this statement of the *Tāj ul-Maāshir* by saying, "but this certainly took place ten years before 599 H."*

Major Raverty is mistaken, however, on his own authorities, when he asserts that the conquest of Bengal took place in 590 H., or A. D. 1194. According to his translation of Muhammad Bakhtyár's biography and the Bibl. Indica text, we see—

(1) That Muhammad Bakhtyár appeared before Quṭbuddín in *Dihlí*, and was rejected by reason of his humble condition.

According to Major Raverty, Dihlí was occupied in 589; hence Muhammad Bakhtyár must have been rejected in or after 589 H.

(2) After his rejection, Muhammad Bakhtyár goes to Badáon, where Hizabr gives him a fixed salary.

(3) *After some time*, Muhammad Bakhtyár goes to Audh, where he obtains certain fiefs near the Bihár frontier. He now undertakes plundering expeditions, which continue, according to the printed text, *for one or two years*.†

(4) He invades Southern Bihár and takes the town of Bihár. He then goes to Dihlí, where he remains for some time at Quṭb's court.

(5) *The second year after his conquest of Bihár*, he sets out for Bengal, and takes Nadiyá.

Now, how is it possible, with these five chronological particulars, that Muhammad Bakhtyár could have left Bihár, as Major Raverty says, in 589 H., to invade Lakhnautí, if Quṭb occupied Dihlí in 589?§ It would, indeed, be a close computation if we allowed but five years for the above events, *i. e.*, if we fixed the conquest of Bengal as having taken place in 594, or A. D. 1198.

To continue. We further find—

* Raverty's translation of the *Tabaqát*, p. 524.

† Ed. Bibl. Indica, p. 147, l. 12. Major Raverty has left this out.

The conquest of Bihár, in the list of Mu'izzuddín Muhammad's victories, is styled the conquest of Adwand Bihár (ادوند بهار), for which the printed text has 'Awand Bihár' (اوند بهار). I dare say the word intended is داند 'High-ground Bihár,' *i. e.*, South Bihár. Thus a parganah of Sirkár Munger in South Bihár is called سكھواره داند Sik'hwárah. The plain of Bihár north of the Ganges was not conquered by Muhammad Bakhtyár.

§ Raverty, p. 553. In note 6 to p. 550, Major Raverty says that Muhammad Bakhtyár first presented himself to the Sultán at *Lahor*, but the text has Dihlí (p. 549).

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(6) That Muhammad Bakhtyár, after the taking of Nadiyá, selects Lakhnauti as his capital,* brings "the different parts of that territory under his sway, and institutes therein, in every part, the reading of the *khutbah*, and the coining of money; and through his praiseworthy endeavours, and those of his Amírs, *masjids*, colleges, and monasteries, were founded in those parts." (Raverty, p. 559.)

(7) *After some years had passed away*, Muhammad Bakhtyár invades Tibbat.

(8) He returns discomfited, and is assassinated, immediately on his return, at Deokot in 602 H.

The invasion of Tibbat may have taken place in 601, as Major Raverty says; but as Muhammad Bakhtyár had before been *for some years* engaged in settling his Lakhnauti territory, it is clear that Nadiyá must have been taken about 594 or 595, *i. e.*, in A. D. 1198 or 1199. Thus, on the authority of the *Ṭabaqát*—the only authority which we possess for this period—the year (599) chosen by Mr. Thomas for the conquest of Bengal is a little too late; but the year 590, fixed upon by Major Raverty, is impossible as being too early.

The conquest of Mahobá by Quṭb and the arrival of Muhammad Bakhtyár's presents, which according to the *Tāj ul-Maʿāshir* and *Firishtah* took place in 599, involve therefore no contradiction as far as chronology is concerned.

We may now safely assume that the conquest of Bengal by Muhammad Bakhtyár took place about 1198-9 A. D.

Before proceeding to the next point, I have to make a remark on the name of Quṭbuddín Aibak, of the Paralyzed Hand, though I had thought that Mr. Thomas had set this question at rest. The text of the Bibl. Indica Edition of the *Ṭabaqát* (p. 138)—and Major Raverty's MSS. have clearly the same words—has the following—

بظاہر جمالی نداشت و انگشت خنصر او از دست شکستگی داشت بدان
سبب او را ایبک شل گفتند *

If the editor had given more diacritical marks, he would have written *shikastagié*, with the *yá i tankir*, as in *jamalé*. The literal translation is—

Outwardly he had no comeliness, and his little finger [of one hand] possessed an infirmity. For this reason they called him *Aibak i shall* [Aibak with the paralyzed hand].

Major Raverty translates—

He possessed no outward comeliness; and the little finger [of one hand?] had a

* It is a curious coincidence that Lakhnauti near the Jamuná, S. W. of Saháranpúr was a Turkmán colony. *Vide* my A'in text, Vol. I, p. 525, and Atkinson's N. W. P. Gazetteer, II, 298.

fracture, and on that account he used to be styled *Ibak i Shil*. [The powerless-finger-ed.]

In a footnote he says that the words *ز دست* in the printed text are not correct and spoil the sense.

But, *firstly*, 'shikastagī' is an abstract noun, and does not mean 'a fracture', but 'weakness, infirmity'; 'a fracture' would be the noun 'shikast.*' There is no evidence that his finger was actually broken; for Aibak is not called "Aibak of the broken finger." *Secondly*, the words *az dast*, which Major Raverty condemns, are absolutely necessary; for if left out, *خنصر* might refer to his little toe [*خنصر از پا*]. *Thirdly*, there is no Persian word *shil*, meaning 'soft, paralyzed', and an Arabic word *shal*, meaning 'withered'; but the Persians use the Arabic *shal*, or rather *shall*, 'having a withered hand'. *Fourthly*, Major Raverty says that *ibak* in Turkish means 'finger'; hence 'Ibak' alone cannot be the real name of Qutbuddīn, but '*Ibak-i-shil*'. Supposing this name to be correct, the *izāfat* must be cancelled, and the words should be inverted, '*shil-ibak*.'† But in all Turkish dictionaries that I have been able to consult, *ibak* is stated to mean 'a crest', 'a comb', not 'a finger'; nor is *aibak*, or *ebak*, given with the meaning 'finger-cut,' as stated by Major Lees in the Journal of the Royal Asiatic Society,‡ but in the sense of 'idol', and the *Shams-ullughāt* gives the etymology *آبي بك*, i. e., *ميرماه*, 'Lord of the moon'.

Mr. Thomas, therefore, is quite correct in looking upon Aibak as the original name, and this is confirmed by mural testimony. It moreover agrees with Aibak's history. As he was captured *and sold*, when a child, he must have been a heathen; for Musalmāns cannot be sold, least of all to a Qāzī who administers justice. Hence Aibak's name must have been a heathenish (Turkish) name; and neither 'Qutbuddīn', nor 'I'bak-shil' which contains a rare *Arabic* word, can possibly have been his name.

If we could attach the slightest weight to the legend on Qutbuddīn Aibak's coinage as given by Major Raverty on p. 525 of his translation, Major Raverty would be refuted by his own remarks; for in the legend Qutbuddīn is merely called 'Aibak', as on inscriptions and in several places of the *Ṭabaqāt*. I, too, have a work in my possession on the 'Coins of the Salāṭīn i Hind', a modern demi-quarto Dihlī lithograph, based on Sayyid Ahmad's *A'ṣār uṣṣanādīd*, and I dare say I have discovered

* Cf. *رنجيدگي* and *رنج* a wash, and *شکستگی* the state following a wash, i. e., cleanness; and many others.

† This is required by the Persian idiom; for you say *shikastah-pā*, 'a man whose foot is broken'; *ranjīdah-dil*; *shash-angusht* 'a man who has six fingers'; hence at least *shal-ibak*.

‡ J. R. A. S., Vol. III, 1868, p. 438. He has transferred to *aibak* the meaning of *shall*.

the source of Major Raverty's information. But any one that has worked for six months among Indian coins, will reject the legend as unnumismatic. The same must be said of Major Raverty's inscription on the coinage of A'ram Sháh, Aibak's son.*

The Turkish word *آی* *āi*, 'a moon', occurs also in other names of Indian history; but the oldest dictionaries give the pronunciation *ē*. Thus in *Ai-tigín* or *E'-tigín*, and *Ai-lititimish*, the emperor "Altamsh", the shortened Indian spelling and pronunciation of whose name has been proved by metrical passages, inscriptions, and good MSS., to be *E'ltitnish*, *Iltitnish*, *E'ltimish*, and *E'litimish*. I look upon Major Raverty's spelling 'I-yal-timish' as behind modern research.†

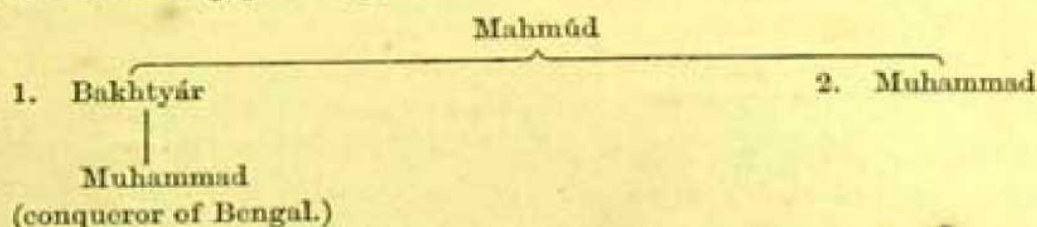
The next point which claims our attention is the name of the Muhammadan conqueror of Bengal. The only thing we knew hitherto (and I believe it is all we know now) is that the conqueror of Bengal was called

Muhammad Bakhtyár,

and that the name of his paternal uncle was

Muhammad Máhmúd.

The names of these two persons Major Raverty breaks up, by introducing an artificial *izáfat*, or sign of the genitive, into four names, viz. Muhammad-i-Bakhtyár, and Muhammad-i-Mahmúd. This would give, if correct, the following genealogical tree—



* It is odd that the printer's devil should have left his mark on Major Raverty's legend of A'ram Sháh's *pseudo*-coin; the devil has *háza lá dirham*, &c., and I agree with him.

I take this opportunity to justify Abul-Fazl. Major Raverty says (p. 529)—"Abul-Fazl makes the astonishing statement that A'ram Sháh was Qutbuddin's *brother*!" Abul-Fazl states twice and distinctly that A'ram Sháh was Aibak's *son*; vide my A'in text, pp. ৫২০ and ৫২২.

† Major Raverty introduces dangerous innovations in other names. I only speak of names that occur in pp. 500 to 600. On page 577, he speaks of a "Sálár [a leader, chief] Zaffir." This should be 'Sálár Zafar', where Sálár belongs to the name. "Zaffir" is *not* used in names. He calls the town of Kálpí "Kálbí"; Guhrám, "Kuh-rám"; Badáog, "Budá'un"; Sarsutí, "Sursutí"; Síwistán, "Síwastán"; Jumáda, "Jamádi"; Shaikh-ul-'A'rifín, "Shaikh-ul-'A'rifain"; Tazkirah, "Tazkarah"; Abú Bakr, "Abú Biker"; shajarah, "shajirah"; Siráj, "Saráj"; Dinájpár, "Dínjápár"; Wainá-Ganga, "Wana-Gangá"; Godáwari, "Gúdáwúrí"; Ráisín, "Rásín"; Chutiya Nágpár, "Chhotah Nágpár"; A'çaf, "A'çif"; Jhârkhand, "Jhârkundah"; Karamnása, "Karmahnásah"; Bikrampár, "Bikrámpár"; Dak'hin, "Dak'han".

Major Raverty says in explanation that "in his older MSS." the word *bin*, or son, is inserted between the words Muhammad and Bakhtyár in the heading of Chapter V, which contains the biography of the conqueror of Bengal; hence the conqueror of Bengal was Muhammad, and "the father's name, it appears, was Bakhtyár, the son of Mahmúd."* It is not stated in how many MSS. this *bin* occurs; but though it occur in the heading, it never occurs in the text.† Nor does the word *bin* occur in the MSS. of the *Táj ul-Maáshir*, in *Firishtah*, the *Tabaqát i Akbarí*, *Badáoní*, and later writers, though the authors of these histories must have had very good MSS. of the *Tabaqát i Náçirí*, some of which in all probability were older than those in Major Raverty's possession. Hence I look upon the correctness of the solitary *bin* in the heading of some of Major Raverty's MSS. as doubtful. Further, supposing *bin* to be correct, is it not strange, nay totally un-Persian, to speak continually of Muhammad-*bin*-Bakhtyár, or Muhammad-i-Bakhtyár, instead of using the single name of Muhammad. This would be Arabic usage. Thirdly, if Mahmúd were the grandfather, it would have been extraordinary on the part of the author to have left out the grandfather in the heading and in the beginning of the chapter, when Muhammad Bakhtyár's descent is spoken of, and merely incidentally to mention it in connection with the paternal uncle. Lastly, the use of the *Izáfát*, instead of *bin* or *pisar* (son), is restricted to poetry, and does not occur in prose.‡ I see,

* Page 539, of his translation.

† The name of Muhammad Bakhtyár occurs more than thirty times in Major Raverty's chapters V and VI (pp. 548 to 576); but in every case Major Raverty gives Muhammad-i-Bakhtyár, *i. e.*, the *Izáfát*. Hence his MSS. have no *bin* in the text. In the heading of Chapter VI, there is no *bin*, though Major Raverty puts it in; he tries even to do so in the heading to Chapter VIII, in the name of Husámuddín 'Iwaz, and "one or two authors" get the credit of it.

‡ In fact, it is rare in poetry, and poets do not even like to use this *Izáfát*, unless it is long *ob metrum*, or unless it stand in syllables where it cannot be mistaken for what Prosodians call the *nim-fathah*. I have also met with it in the *prose* legends of coins, where *ibu* was left out to save space.

Major Raverty writes several other names in the same chapters with this impossible *Izáfát*. Thus he gives the murderer of Muhammad Bakhtyár the name of 'Alí-i-Mardán, *i. e.*, 'Alí, the son of Mardán. But Mardán, by itself, is no Muhammadan name, nor is Sherán by itself. We cannot write Muhammad-i-Sherán, Ahmad-i-Sherán, making Sherán the father. 'Alí Mardán means 'Alí (who is as valiant as) many men; Muhammad Sherán = Muhammad (who is equal to) many lions. The distinguished 'Alí Mardán, for example, under Sháhjahán, cannot be called 'Alí-i-Mardán, *i. e.*, 'Alí, son of Mardán, because his father's name was Ganj 'Alí (I have purposely written "Ganj 'Alí" without *Izáfát*). Would Major Raverty write the name of Jámí's patron Mír 'Alí-i-Sher; or Muhammad Humáyún's name, Muhammad-i-Humáyún; or Muhammad Akbar's name, Muhammad-i-Akbar? The form of the name of Muham-

therefore, no reason to change the name of the conqueror of Bengal, as proposed by Major Raverty.

A point of some importance is the fact prominently noticed by Major Raverty that the establishment of Muhammadan rule in Bihár and Bengal has nothing to do with the Muhammadan kingdom established at Dihlí. Muhammad Bakhtyár is an independent conqueror, though he acknowledged the suzerainty of Ghaznín, of which he was a subject. The presents which he occasionally sent to Dihlí, do not alter the case: a similar interchange took place between the kings of the Dak'hin and the later kings of Dihlí. Bihár and Bengal were conquered without help from Qutbuddín, and in all probability without his instigation or knowledge. This view entirely agrees with the way which Minháj-i-Siráj speaks of the Mu'izzí Sultáns and their co-ordinate position.

Major Raverty's identification of Muhammad Bakhtyár's jágir lands with the parganahs of Bhagwat and Bhoilí, south of Banáras and east of Chanárgarh, is very satisfactory. Bhoilí, (بھولی) I find, is mentioned in the A'in i Akbarí, where it is spelt 'Bholí' (بھولی). It belonged to Sirkár Chanár (Chanádh), the chieftown of which was the well known fort of Chanár. Under Akbar, Bhoilí measured 18,975 bighahs 10 biswas, and was assessed at 1,112,656 *dáms*, of which 33,605 *dáms* were *sayurghál* or rent-free land. Regarding Bhagwat, Elliot says—"This parganah, previous to the conquest effected by the Gautams, was held by Jami'at Khán Gaharwár, whose defence of the fort of Patítah is a favorite theme with the people. The old name of this parganah is Hanoa, which was extinct before the time of Jami'at Khán, when it was known only as Bhagwat."*

mad-i-Súrí, on whose name Major Raverty has built a hypothesis (Journal, A. S. Bengal, for 1875, p. 31) is doubtful for this *Izáfat*. On p. 573, two brothers are mentioned, Muhammad Sherán and Ahmad Sherán, and Major Raverty looks upon this as a proof that the *Izáfat* must be read, "as two brothers would not be so entitled." A glance at a Muhammadan school register would show that Major Raverty's opinion is against facts. Supposing a father's name is 'Alí Sherán, he would call his son Muhammad Sherán, Ahmad Sherán, Mahmúd Sherán; or if Bazl i Haq, the sons would be called Fazl i Haq, Luţf i Haq, &c.

Of course, it is different with the *takhalluţ*, or *nom-de-plume*, of Persian writers. Thus we may say Minháj-i-Siráj, just as we say Muçlihuddín-i-Sa'dí. But even in such instances the *izáfat* is not *de rigueur*. But "Minháj-i-Siráj" does not mean in prose 'Minháj, the son of Siráj', but 'Minháj, who writes under the name of Siráj'. That the father's name was Siráj has nothing to do with it: many poets chose the name of the father as *takhalluţ*.

How ill-placed some of Major Raverty's *Izáfats* are may be seen from the name of the Bengal Sultán Fírúz Sháh (II) in note 6, on p. 582, where besides Sháh-i-Jahán is a wrong reading. Nor has he ever been called a 'Pathán'.

* Beames, Elliot's Races of the N. W. P., II, p. 119. The name of Bhagwat, therefore, occurs already in the *Tabaqát i Naşirí*. Neither Bhagwat nor Hanoa is given

The narrative of Muhammad Bakhtyār's expedition to Tibbat involves one or two geographical difficulties, which neither the restored text nor Major Raverty's copious notes have entirely removed. The traffic between Bengal and Tibbat in those days, and even up to the reign of Akbar, seems to have been very considerable. Minháj speaks of no less than thirty-five roads into Tibbat between the bend of the Brahmaputra and Tirlut. To one of these Major Raverty's MSS. give the (slightly doubtful) name of 'Mahamhái Pass.' The traffic consisted chiefly in gold, copper, lead, musk, yak tails, honey, borax, falcons, and hill ponies (*táng'han*). Ralph Fitch* mentions Chichákoṭ as the principal emporium in the (now British) Dúárs.

The whole tract south of Bhútan frequently changed rulers. The Rájás of Kámrup, the Ahoms, the Kámatá, and after them the Koch Rájás, seem to have in turn held the Dúárs and lost them to the Bhúts.

It is difficult to say what motives Muhammad Bakhtyār had to invade Tibbat. It was perhaps, as Minháj says, ambition; but if we consider how small a part of Bengal was really in his power, his expedition to Tibbat borders on foolhardiness. He seems to have set out from Lakhnauti or Deokoṭ under the guidance of one 'Alí, who is said to have been a chief of the Mech tribe, and marched to Bardhankot (Varddhanakúti). From the way in which Minháj mentions this town, it looks as if it had lain beyond the frontier of Muhammad Bakhtyār's possessions, though there is no doubt as to its identity. The ruins of Bardhankot lie due north of Bagurá (Bogra), in Long. 89° 28', Lat. 25° 8' 25'', close to Govindganj, on the Karataya River.† According to Minháj, a large river flows in front

in the A'in. I have not found Major Raverty's Kuntilah on the maps. Its longitude and latitude, as given by him on p. 550, almost coincide with those of the town of Kuntit (كنيت), which up to the time of the Mughul (Chaghtái) Dynasty was a sort of frontier town, and is therefore occasionally mentioned by historians. But Major Raverty's Kuntilah (Lat. 25° 7'; Long. 82° 35') lies too far to the west.

The fact that some MSS. of the *Ṭabaqát* give Bhagwat and Bhoilí, and others Patitah and Kuntilah (‡), is curious.

* *Vide* Journal, A. S. Bengal, 1873, Pt. I, p. 240. In 1861, Major Sherwill estimated the number of hill-ponies brought for sale to the fair at Nek-Mardán, 40 miles north-west of Dinájpúr, at 3000.

† Not far from Ghorághát. Sheet 119 of the Indian Atlas shews the "Rájbári" of the Bardhankot Rájás. *Vide* Westmacott in J. A. S. B., 1875, Pt. I, p. 188.

Major Raverty has not identified Bardhankot, and has therefore been misled to place it north of Sikkim (p. 562, note); hence it is no wonder that he finds discrepancies in Minháj's statements respecting the river and the bridge mentioned further on. But there are none. Col. Dalton's attempt at identifying the bridge with that of Sil Háko (J. A. S. B., XX, p. 291), and the river with the Brahmaputra, is now likewise disposed of. The only difficulty that is left to be solved is the identification of the Tibetan town of Karbatan (§), for which each MS. almost has a different *lectio*.

(*dar pesh*) of the town. This can only refer to the Karataya, which formed so long the boundary of ancient Muhammadan Bengal and the Kámrúp, and later of the Koch and Koch-Hájo, dominions; in fact it was the boundary between Bengal and Kámrúp at the time of the Mahábhárat. Though the river in front of Bardhankot is said to have had the name of 'Bagmati', no other river than the Karataya can possibly be meant.* Along the Karataya, then, Muhammad Bakhtyár marched northward, under the guidance of 'Alí the Mech, for ten days. We have to bear in mind that the Karataya in former times was connected by branches with the Tistá, (Trisrota) and that the Tistá before 1784 flowed *west* of the Karataya, joined the Atrai, and fell into the main branch of the Ganges (Padma). Thus even as late as last century, as a glance on Map V of Rennell's Atlas will show. The ten days' march, therefore, extended along the Karataya and the Tistá, which of all Bengal rivers extends farthest into Tibbat. There is little doubt that this was along the frontier of the territory of the Rájá of Kámrúp. Before the tenth day, they were among the mountains, and on the tenth they reached a bridge of hewn stone, consisting of twenty-odd arches. This bridge must have been in the neighbourhood of Dorzheling, or, as we spell it, Darjeeling.† 'Alí the Mech seems to have here taken leave of Muhammad Bakhtyár. Even at the present day, the boundary separating the Meches from the hill tribes, is about twelve miles due south of Darjeeling, near Pankabárf. From here we have insufficient particulars regarding Muhammad Bakhtyár's march. All that is said is, that after passing the bridge the troops wended their way, unmolested apparently, stages and journeys, through defiles and passes, ascending and descending among lofty mountains. On the sixteenth day the open country of Tibbat was reached. Everywhere they had passed through populous villages. After plundering the country and defeating with heavy losses a hostile army near a fort in the neighbourhood of a town (called Karbatan?), Muhammad Bakhtyár resolved to return. Since he returns by the way he had come, the direction of his march from Darjeeling must have been northward‡; for if he had

* Regarding the changes in the courses of the Karataya and Tistá, *vide* Buchanan, and Glazier's Rungpore Report, p. 2.

† The Muhammadans write دارجلنگ Dárjiling. Major Mainwaring tells me that the correct pronunciation is Dorzheling, درژلنگ, with a short o and a short accented e. The straight distance from Bardhankot to Darjeeling itself would be nearly 160 miles.

I find that Sayyid Ahmad in his edition of the Tuzuk i Jahángírí (p. 116) gives Dárjiling in connexion with Pegú, in the sentence

مردم مکه که ملک ایشان متصل پیگو دارجلنگ است

"the Maghs whose country is adjacent to Pegú-Dárjiling." But I conjecture that this is a mistake for پیگو و ارخانگ Pegú and Arkhang, 'Pegu and Arrakan'.

‡ Major Raverty suggests the route which Turner went in 1783, through Sikkim

deviated to the west into Nepál, he would certainly have retreated southward into Tirhut. The retreat was disastrous, as the people had removed from the line of march and had burnt everything. After fifteen days of privation, Muhammad Bakhtyár issued *from the mountains into the country of Kámrúp*, and reached the head of the bridge. The guards which he had left there, had deserted their post; the Hindús of Kámrúp had come and destroyed the bridge, and Muhammad Bakhtyár occupied a strong temple near the bridge. He was now besieged by crowds of Kámrúp Hindús. With difficulty did the thinned army cut through the besiegers and hasten to the river. Most of the Musalmáns perished; only Muhammad Bakhtyár with a few horsemen reached the other bank. There they were again assisted by Meches, the kinsmen of 'Alí, who rendered him great assistance until he reached Deokot, or Damdamah, south of Dinájpúr.

Muhammad Bakhtyár from anguish became ill and took to his bed, when 'Alí Mardán assassinated him (602 A. H.) at Deokot.*

Major Raverty is inclined to place Deokot north of Dinájpúr; but the position is well known. Parganah Deokot still exists, and the old Muhammadan ruins at Gangarámpúr, near Damdamah, the large tanks, and the discovery there of the oldest Bengal inscriptions, fix the site of the ancient Deokot.

The additional *lectiones* of geographical names which Major Raverty gives, enable me to identify three more places mentioned in the *Ṭabaqát*, viz., Santosh, Masídhá, and Kangor,† of which the last was the fief of Husám-uddín 'Iwaz. Santosh, which lower down is identified with Mahíganj on the eastern bank of the Atrai River, contained, according to the *Ṭabaqát*, the tomb of Muhammad Sherán, the successor of towards the Sangpú, and I agree with him, though I do not believe that Muhammad Bakhtyár reached that river.

* Regarding the reigns of Muhammad Bakhtyár's immediate successors, I would refer Major Raverty to Mr. Thomas's "Initial Coinage of Bengal, No. II," in J. A. S. B., 1873, p. 348, and Proc., A. S. B., 1872, p. 202.

† The MSS. have سنطوس, منطوس, مكيدو, مكسدو, and كنگوري, كنگوري, and several other *lectiones*; vide J. A. S. B., 1873, p. 212, note †. The *káf* in مكسدو must be wrong; it arose very likely from the sign of *fathah* above the initial *mim*, and the correct name is مسده or مسيدها or مسدها, Masídhá or Masidhá, *Bengalica* Mosidhá, which is mentioned as an old place in the A'in and in Buchanan's Dinajepoor. Major Raverty identifies 'Maksidah' with the "Maxadabad" of the old travellers; but Maxadabad is Maqqúdábád (مقصود آباد), the earlier name of Murshidábád. Maqqúdábád, however, is itself not older than the 16th century.

I prefer the text reading بنگاون Bangáon, a wellknown place near Deokot, to Major Raverty's 'Bekánwah'. The spelling 'Kons' for 'Kosí,' the river Kosí (Raverty, p. 578), may also be an error of the copyists, the final *yá* having been mistaken for the tail (*dáirah*) of the *sín*.

Bakhtyár Khiljí. The three places lie in *adjacent* parganahs, and lie all south-east of parganah Deokot, as shewn on Sheet 119 of the Indian Atlas. The correctness of my conjecture regarding the name of Santosh has thus been verified by Major Raverty's MSS., and its identification shews that Masidhá, which is mentioned with it, is likewise correct. The situation of these parganahs agrees with the small extent of the Lakhnauti territory under the first Muhammadan rulers; for they lie between Deokot and the Karataya, which was the frontier. In fact Husám-uddín 'Iwaz was the first that brought *the whole territory* of Gaur under control.

The places that are still doubtful in the Bengal geography of the Tabaqát, are Nárankoí or Nárkotí, for which other works have 'Bársúl'; and Sanknát, which is very likely the name of a region east of the Karataya.

Major Raverty's assertion* (pp. 582, 559) that Lakhnauti was called by the emperor Humáyún 'Bakhtábád', and the whole district 'Jannatábád', is untenable. The Akbarnámah only mentions 'Jannatábád'.

Regarding Jájnagar and its identification with the eastern parts of the Central Provinces, Chutiyá Nágpúr,† and the Tributary Mahalls in Western Orísá, Major Raverty has come to the same conclusion as I had. His identification of the frontier district Katásín or Katásín with a place of the name of Katásingh on the northern bank of the Mahánadí in the Tributary Mahall of Angul is not yet quite clear to me. I cannot find the place on the map, and the narrative of the Tabaqát implies a place nearer to Western Bengal. The capital of Jájnagar, which in the MSS. is called U'mardan (اورمردن) remains to be identified. Major Raverty hints at the possibility

* His source is a MS. of the *Khuldát-uttawdrih* (a modern work). I have a suspicion that 'Bakhtábád' is a copyist's error, and that the initial *b* is the Persian preposition *ba*, as in *Gaur rá mausúm ba-Jannatábád sákht*, where بجنآباد has been drawn together to بخنآباد.

Major Raverty's 'Arkhnák' (p. 593) is a wrong reading for 'Arkhang' or 'Rakhang'. "Parganah Jasúdah" (p. 593)—said to have been turned by Europeans into 'Jessore'—is a copyist's error for 'Parganah Chittáah', (200 miles from Jessore) which was the frontier between Bengal and Orísá; *vide* Aín translation, Index. Besides, where does the Persian author of the *Haft Iqlím* get the Hindí 3 from? and how can he give the revenue of Bengal under Jahángír, when the book was written in 1002 (*vide* Aín translation, I, p. 508)? Again, the word بیابان 'uncultivated tract' of Sirkár Madáran (p. 592, last line) is a mistake for پایان confines, frontier; but *páyán* does not mean 'lower parts', as translated on p. 568, note.

† Major Raverty's spelling Chhotah Nágpúr has often been shewn to be erroneous, as the correct name is Chutiyá Nágpúr (چٹیا), from the old capital Chutiyá, near Ráncí. The spellings Chhár-kund and Jhár-kundah involve a wrong etymology, the correct name being Jhár-khand, 'bush-district', as Bundel-khand, 'the Bundelá district', from खंड, a district, not from कुंड, a well.

286 H. Blochmann—*History and Geography of Bengal*.—No. III. [No. 3, of U'mardan being Amarakantak, the highest point and watershed of the eastern parts of the Central Provinces. That rocky, wild, and inaccessible region is scarcely a fit place for the capital of what must have been a large state.*

As the border land to the west of Jájñagar Major Raverty mentions Garha-Katanga; and then he says (p. 587), quoting the *Ma'dan-i-Akhhár i Ahmadi*, that "on the N. it is close to the Bháṭah territory [the Bháṭi of the *Áin i Akbari*], and S. is close to the Dakhan." But this is an extraordinary confusion of names, partly due to the author of the *Ma'dan*, especially if he wrote Bháṭah with a long ā. He means Bhāt'h, or Bhat-ghorá, the mountainous tract south of Allahábád, whilst Bháṭi is the name of the Sundarban region along the Bay of Bengal. The Ṭabaqát is, indeed, the oldest work in which Bhatghorá is mentioned. The district was plundered by Qamaruddín Timur Khán, who had also been fighting with the aboriginal tribe of the Múásis.† In Major Raverty's quotation from the *Jámī-utta-wárikh* (a modern compilation without value), the Bháṭi-Sundarban is placed West of Bengal;‡ and in the quotation a little further on (which like the preceding is taken from the *Áin i Akbari*),—"In the *sarkár* of Mangir, "from the river Gang to the Koh i Sangín [the Stony Mountains], they "have drawn a wall, and account it the boundary of Bengal", a wrong *izáfat* spoils the sense: Abul Fazl says that in Sirkár Munger, from the Ganges to the mountains [Rájmahall Hills], they have drawn a stone wall, &c. He means the stone wall near Gaḍhí or Garhí (Teliágarhí).§

We now turn to the middle period of the Muhammadan history of Bengal, for the elucidation of which a few new and interesting particulars have come to hand. They throw further light on the reigns of Rájá Káns and Mahmúd Sháh I.

Raja' Ka'ns.

(A. H. 808 to 817; A. D. 1405 to 1414.)

It was mentioned before that Mr. Westmacott identified Rájá Káns with the well known, but hitherto legendary, Rájá, or Hákim, Ganesh of Dinájpúr. I look upon this identification as open to doubt. 'Ganesh' is a very common name, and the god with the elephant's trunk is so generally

* The name of Hill Gundamardan, in Long. 83° and Lat. 20° 55', in Borásambhar, has the same ending as U'mardan.

† *Vide* Ṭabaqát, Ed. Bibl. Indica, p. 247; Beames, Elliot's Races of the N. W. Provinces, II, 164; J. A. S. B., 1874, Pt. I, p. 240, note.

‡ Regarding the 'Mánik,' *vide* J. A. S. B., 1874, Pt. I, p. 204.

§ Major Raverty, on p. 592, mentions the Afghán Zamíndár of Bírbbhúm and *Ját-nagar*—the italics, I daresay, imply a reference to Jájñagar. The Zamíndár's family, the descendants of a real Pathán for once, are well-known; but *Játnagar* is a mistake of 'Rájñagar'.

known throughout India, that even Muhammadans may be fairly assumed to be acquainted with his name. But all MSS. spell the Rájá's name كانس *Káns*, not گنيس *Ganēs*; and I am inclined to adhere to the spelling of the MSS. and read the name as *Káns* or *Kánsa*. This would indeed be the name which Krishna's enemy, the tyrant of Mathurá, bore. I do not think that the name is now in use, or has been in use in Bengal since the spread of Chaitanya's Krishna-cultus. But Rájá *Káns* lived just a hundred years before Chaitanya, and the name might not then have been so unusual as it would now be. Further, Rájá *Káns* is styled 'Rájá of Bhatúriah', and Rájá Ganes 'Rájá of Dinájpúr'. But Bhatúriah does not include Dinájpúr; for 'Parganah' Bhatúriah lies far to the south of Dinájpúr District, in Rájsháhí proper, between Amrúl and Bagurá. But the name 'Bhatúriah' is also used in a more extensive sense, and signifies Northern Rájsháhí proper. It thus formed part of Barendra, whilst Dinájpúr with the northern districts formed the old division of Nivritti. Now the Barendra Bráhmans, as Dr. Wise tells me, say that their social classification was made by one Rájá *Káns* Náráyana of Táhirpúr in Rájsháhí; and as Táhirpúr belongs to Bhatúriah (*vide* Map VI of Rennell's Atlas), there is just a possibility that the statement of the Barendra Bráhmans may give us a clue and help us to identify the historical Rájá *Káns*.

I have no doubt that the name of the district of Rájsháhí is connected with Rájá *Káns*; for just as Mahmúdsháhí, Bárbaksháhí, and other names in the neighbourhood of Rájsháhí refer to the Bengal kings Mahmúd Sháh and Bárbak Sháh, so can Rájsháhí, *i. e.*, Rájá-sháhí, only refer to the Rájá who was 'the Sháh', *i. e.*, to a Hindú Rájá who ascended a Musalmán throne. In its shortened form, 'Rájsháhí' is certainly a most extraordinary hybrid; for the Hindí *rāj* is the same as the Persian *sháhí*.

It was remarked in the first part of these 'Contributions to Bengal Geography and History' that Rájá *Káns* did probably not issue coins in his own name. We know, however, that coins were issued during his reign, *viz.*, posthumous coins of A'zam Sháh, during whose reign Rájá *Káns* rose to influence, and coins in the name of one Báyzid Sháh. The latter issue was described by me before, and bears, as far as is now known, the years 812 and 816; the former was brought to the notice of the Society by the Hon'ble E. C. Bayley (*vide* J. A. S. B., 1874, p. 294, note). I can now give a figure of the posthumous coinage: two specimens were lately brought for the Society's cabinet,* clearly dated 812 (*vide* Pl. XI, Fig. 1). They weigh 164·69 and 165·7 grains respectively.

* Together with five silver coins of Muhammad Sháh, son of Rájá *Káns*, dated 818, 819, 822, 823, 826. The hitherto ascertained years of his reign were 818, 821, and 831. Mr. W. L. Martin also sent me lately a Muhammad Sháh of the same type as published by me. It was dug up near Madhúpurah, Northern Bhágulpúr, which belonged to Bengal.

Mahmu'd Sha'h I.

(A. H. 846 to 864; A. D. 1442 to 1459.)

The chronology of the reign of this king, which was hitherto one of the obscurest portions of Bengal History, has been further cleared up by a small but important *trouvaille* of eight silver coins struck by him. The coins were found by Major W. W. Hume at Mahásthán (Mostán) Garh, seven miles north of Bagurá: four of them were sent to the Society by Mr. C. J. O'Donnell, C. S., who in the last number of the Journal gave a description of the place, and the other four were received from Mr. E. Vesey Westmacott, C. S. The eight coins have been figured on Pl. XI, Nos. 2 to 9. Five of them have years, so that the ascertained dates of Mahmúd Sháh's reign are now—846, 84*, 852, 858, 859, 861, 862, 863, 28th Zil Hajjah 863.

Nos. 2, 3, and 9 of the coins are very rude specimens of engraving; and if the last had not been found together with the others, I would be inclined to attribute it to Mahmúd Sháh II., as the *kunyah* looks more like 'Abul Mujáhid' than like 'Abul Muzaffar'. All the coins bear numerous shroffmarks.*

1. *Vide* Pl. XI, No. 2. New variety. Silver. A. H. 84* No mint-town. Weight, 164·97 grains.

OBVERSE— المؤيد بقائيد الرحمن حجت

Margin—ضرب سنة ٨٤٠

REVERSE—ناصر الدنيا والدين ابوالمظفر محمود شاه سلطان

The legend is the same as on Col. Hyde's unique Mahmúd Sháh of 846, published by me in J. A. S. B., 1874, p. 295.

2. *Vide* Pl. XI, No. 3. Obverse as reverse of No. 1; Reverse illegible, probably the same as in Nos. 5, 7, 8, 9. Weight, 165·65 grains.

3. *Vide* Pl. XI, No. 4. A. H. 852. Weight, 164·41 grains.

OBVERSE—as in No. 3.

Margin—ضرب في ٨٥٢

REVERSE—خلد الله ملكه وسلطانه

* The object of these marks, which are common even on early Bengal coins, was to depreciate the coins. The real commerce of the country was carried on in cowries, as no copper was issued; and it suited the bankers and money-changers, when coins bearing the new year were issued, arbitrarily to declare that the coins of the past year, and those of all previous years, were no longer *kulldár* (كلدار, from the Arabic *kull*, all), i. e., all-having, of full value. Hence they disfigured the coins, to the great loss of the public, by small circular stamps, or longitudinal notches, so that it is a wonder that so many coins have come down to us with clear dates. Coins of former years, or coins thus marked by shroffs (صراف), were often called *sandt*, pl. of *sanah*, a year. *Vide* also Buchanan (Martin's Edition), II, p. 1006.

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4. *Vide* Pl. XI, No. 5. Weight, 164·49 grains. A. H. 858. Struck at M a h m ú d á b á d.

OBVERSE—As in No. 3.

REVERSE—نائب غوث الاسلام والمسلمين خلد ملكه ٨٥٨ محمود اباد

5. *Vide* Pl. XI, No. 6. Weight, 165·68 grains. Mahmúdábád? The legend of both faces as on Col. Hyde's coin.

6. *Vide* Pl. XI, No. 7. Weight, 166·2 grains. A. H. 862. The obverse contains the lozenge and square, and the empty spaces of the corners are filled with little crosses, as on Col. Hyde's coin. The reverse contains nine scollops along the margin.

Obverse and reverse as in coin No. 5, but no mint town.

7. *Vide* Pl. XI, No. 8. Weight, 164·28 grains. A. H. 862. The obverse and reverse have each ten scollops along the margin. Legend as in coin No. 5. The year is expressedly في سنة ٨٦٢.

8. *Vide* Pl. XI, No. 9. Weight, 164·77 grains. Legend as in proceeding, but no year.

The Mint town of M a h m ú d á b á d on coin No. 5 is new. If it does not refer to some place within the extensive walls of Gaur, it may have reference to Sirkár Mahmúdábád (Western Farídpúr and Northern Nadiyá).

General Cunningham has sent me a rubbing of the following inscription belonging to Mahmúd's reign. The rubbing is taken from inside the Kotwáli Gate, in Gaur, and refers in all probability to the bridge of five arches near it.

بناء هذه القنطرة في زمن سلطان العادل ناصر الدنيا والدين ابو المظفر محمود
شاه السلطان في الخامس من الصفر ختمه الله بالخير والظفر سنة اثنى و ستين
و ثمانماية .

The building of this bridge (took place) in the time of the just king, Náqirud-dunyá waddín Abul Muzaffar Mahmúd Sháh, the king. On the 5th day of Çafar (may God allow the month to end with success and victory!) 862 [23rd December, 1457].

The inscription measures 1½ ft. by 13 in.* The usual phrase 'May God perpetuate his rule and kingdom!' is left out.

Ba'rbak Sha'h.

(A. H. 864 to 879; A. D. 1460 to 1474.)

Mr. Westmacott sent me rubbings of two new inscriptions belonging to the reign of this king. He says regarding them—"The two Bárbak Sháh

* This is the missing inscription No. 37, alluded to on p. 19, Proceedings, A. S. B., January, 1873.

“inscriptions are taken from the tomb of the Muhammadan Pir, or saint, known by the name of Mahí Santosh, mentioned by Dr. Buchanan (*apud* Martin’s Eastern India, II, 667) as being at Mahíganj, on the eastern bank of the Atrai, in Tháná Potnitalá, District Dinájpúr. He says that the saint has communicated his name to Parganah Santosh, and that the most remarkable thing was that his name is said to be Sanskrit.

“Mr. J. P. Sneyd, who was good enough to take the rubbings for me, says that the city among the remains of which the tomb is situate, is known as Santosh, and that the tombs are said to be those of a lady, named Mahí Santosh, and her daughter.

“The larger inscription is over the inner door of the entrance to the tomb; the smaller one is outside the building. There are quantities of brick and blocks of stone all about, and the remains of a stone wall, and a brick building, said to have been the ‘cutcherry’. The local tradition I look upon as almost worthless. Doctor Buchanan and Mr. Sneyd, an interval of sixty-six years having elapsed, heard quite different stories about the name.

“I do not think the name Mahí Santosh has anything to do with the Muhammadan occupants of the tomb. Santosh is the name of the Parganah, and Mahí is clearly connected with Mahíganj, ‘the mart of Mahí,’ and I cannot but connect that with the Buddhist king of the 9th or 10th century, Mahí Pál.”

If, as Mr. Sneyd says, the ruins round about Mahíganj are called ‘Santosh’, we would have to look for the tomb of Muhammad Sherán, Bakhtyár’s successor, among them.

The name ‘Mahíganj’ cannot be very old, though ‘Mahí’ may be an allusion to Mahí Pál. All names ending with the Persian *ganj* are modern, and I cannot point to a single place ending in *ganj* that existed, or had received that name, before the 15th and 16th centuries.

The two inscriptions, as is so often the case, have nothing to do with the tomb. In all probability, the tomb is older than the inscriptions. Tombs have always been store places for inscriptions of ruined mosques of the neighbourhood. They add to the sanctity of the tomb, because their characters are generally *tughrá*, and therefore unintelligible to the common people; they are poured over with milk and oil by votaries who look upon them as powerful amulets, or by the sick who catch the dripping liquid and get cured.

The larger inscription of the two, which measures 3 ft. by 11 in., is as follows :

قال النبي صلى الله عليه وسلم من بني المسجد في الدنيا بني
الله سبعين قسرا في الجنة * بني المسجد في زمن الملك العادل

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السلطان ابن السلطان ركن الدنيا و الدين ابو المجاهد باريك شاه السلطان
ابن محمود شاه السلطان الباني خان المعظم الغ اقرار خان بواسطي (؟)
خان معظم اشرفخان خمس ستين و ثمانماية ۱۱

The Prophet (upon whom be blessings!) said, 'He who builds the mosque in the world, will have seventy castles built by God in paradise.' This mosque was built in the time of the just prince, the king who is the son of a king, Rukn uddunyá waddín Abul Mujáhid Bárbak Sháh, the king, son of Mahmúd Sháh the king. The builder is the great Khán Ulugh Iqrár Khán, (one word unintelligible*) the great Khán Ashraf Khán. 865 [A. D. 1460-61.]

The builder of the mosque, Ulugh Iqrár Khán, is clearly the same as the one mentioned in Mr. Westmacott's Bárbak Sháh inscription from Dinájpúr, published in J. A. S. B., 1873, p. 272, and no doubt is now left regarding the correct reading of the name. The characters of this inscription are well formed.

The smaller inscription measures 1 ft. 5 inch. by 8½ inch., and consists like the preceding of two lines. Of the first line only the beginning قال عليه السلام 'the Prophet says', is legible. Of the second line I can with some difficulty decipher the following:—

بني المسجد خان الاعظم والمعظم الغ وزير شهر مشهور
باربك آباد مكن ست و سبعين ثمانماية ۱۱

The Mosque was built by the great and exalted Khán Ulugh....., Vazír of the town known as Bárbakábád Makan, 876 [A. D. 1471-72].

The inscription, incomplete as it is, is so far valuable as it is the latest of Bárbak Sháh's reign hitherto discovered. I am not quite sure about the correctness of the word 'Makan' (مكن): there is a long stroke between the *mím* and the *káf*, and the reading *Maskan* (مكن) is possible. Nor can I say with certainty that Bárbakábád is another name for Santosh†; but the name is so far of interest as it explains the name of Sirkár Bárbakábád. This Sirkár was assessed in Todar Mall's Rentroll at 17,451,532 dáms, or Rs. 436,288, and had to furnish 50 horse and 7000 foot. Its 38 Mahalls were the following:—

* The doubtful word *bawdsti* is legible enough, but I do not understand the meaning. It must be a word expressing relationship. Could it be نواسه for نواسه, daughter's son?

The date is clear in one of Mr. Westmacott's rubbings.

† Parganah Santosh does not occur in Todar Mall's rentroll. In the later rentrolls, however the name again appears.

- | | |
|---|---|
| 1. Amrúl (امروں) | 20. 21. Sherpúr and Bahrámpúr
(شیرپور و بہرام پور) |
| 2. Baldah Bárbakábád (باربك آباد
بلدہ) | 22. Tāhírpúr (طاہر پور) |
| 3. Básdaul (باسدول) | 23. Qázíhatti (قاضی ہٹی) |
| 4. Púlárhár (پولارہار) | 24. Kardahá (گردہا) |
| 5. Pustaul (پستول) | 25. Gururhát (گورہاٹ) |
| 6. Barbariá (بربریا) | 26. Guhás (گھاس) |
| 7. Bangáon (بنگاون) | 27. Ganj Jagdal (گنج مشہور بد جگدل) |
| 8. Páltápúr (پالتاپور) | 28. Gobindpúr (گوبندپور) |
| 9. Chhañdiábázú (چھندیا بازو) | 29. Káligái Gúthiá (کالی گائی گوتھیا) |
| 10. Chaurá (چورا) | 30. Kharál (کھرال) |
| 11. & 12. Jhásindh and Chau-
gáon (جھاسند و چوگان) | 31. Kodánagar (کوڈانگر) |
| 13. Chandlái (چندلانی) | 32. Káligái (کالی گائی) |
| 14. Chináso (چناسو) | 33. Lashkarpúr (لشکرپور) |
| 15. Havelí Sik'h Shahr (سیکھ شہر
دوبلی) | 34. Málanchípúr (مالنچی پور) |
| 16. Dhármin (دھارمن) | 35. Masidha (مسدھا) |
| 17. Dáúdpúr (داودپور) | 36. Man Samáli (من سمالی) |
| 18. Sunkárdal, urf Nizámpúr
(سنکار دل عرف نظامپور) | 37. Mahmúdpúr (محمودپور) |
| 19. Shikárpúr (شکارپور) | 38. Vazírpúr (وزیرپور) |

Of these 38 names, four appear to have vanished entirely, *viz.*, Nos. 2, 4, 15, and 31. The others appear also in later settlements. Many of them are still to be found on sheets 119 and 120 of the Indian Atlas. Two new parganahs have appeared, *viz.*, Jahángírpúr and Fathjangpúr, which clearly point to the emperor Jahángír and his Bengal governor Ibráhím Khán Fathjang,* and they may partly occupy the places of the four lost ones.

The Havelí Parganah of the Sirkár is called Havelí Sik'h Shahr, instead of Havelí Barbakábád; but I cannot identify the name. A small portion of Sik'h Shahr also belonged to Sirkár Ghorághát.

No. 25, Gururhát is spelt in the MSS. Guzarhát from *guzar*, a ford. It lies to both sides of the mouth of the Mahánandá.

No. 26, Guhás is spelt on the maps 'Goas', and lies south of the present course of the Podda.

No. 30, Kharál is spelt on the maps 'Kharail' or 'Kharael'.

No. 36, Man Samáli occurs in the Vth Report as Malsimani, but I have not identified it.

* A'in translation I, 511.

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No. 37, Mahmúdpúr is called on the maps 'Muhumudpoor.* It lies immediately north of Rámpúr Boáliyá.

Inscriptions belonging to the reign of Bárbaksháh appear to be more numerous in Sirkár Bárbakábád than in other districts;† but specimens of his coinage are rare.

Yu'suf Sha'h.

(A. H. 879 to 886; A. D. 1474 to 1481.)

About two years ago, Dr. Wise sent me a rubbing of the following inscription, from the neighbourhood of Dháká, I believe, but I have mislaid the reference as to the exact locality. The inscription measures 2 ft. 8½ inch., by 10 inch., and consists of three lines, the first containing the usual Qorán passages in large letters, the second and third giving the historical particulars in small and close letters. At the time I received the inscription, I could decipher but little of lines 2 and 3, and I now give all that I can at present decipher.

قال الله تعالى انما يعمر مساجد الله من آمن بالله واليوم الآخر اقام
الصلوة وآتى الزكوة ولم يخش الا الله فعسى اولئك ان يكونوا من المهتدين *
قال النبي عليه السلام من بني مسجدا في الدنيا بني الله له بيتا في الجنة *
بني هذا المسجد في عهد السلطان السلاطين ظل الله في العالمين
خليفة الله في الارضين السلطان ابن السلطان شمس الدنيا
والدين ابو المظفر يوسف شاه السلطان ابن باربك شاه السلطان ابن
محمود شاه السلطان خلد الله ملكه وسلطانه و اعلي امره و شانه الملك
.... خاقان معظم بهلوي عصر و زمان محمد النبي مؤرخا
في التاريخ سنة خمس و ثمانين و ثمانماية *

كسے را کہ خیرے بماند روان * دمام رسد رحمتش بر روان

God Almighty says, 'Surely he builds the mosques of God who believes in God and the last day, and establishes the prayer, and offers the legal alms, and fears no one except God. It is they that perhaps belong to such as are guided.' The Prophet says, 'He who builds a mosque in the world, will have a house built for him by God in Paradise.'

This mosque was built in the time of the king of kings, the shadow of God in all

* The two dissyllabic names Ahmad and Mahmúd are continually pronounced by Bengalis in three syllables, 'Ahamud', 'Mahamud', or 'Mohomud', which is then confounded with Muhammad. Similarly, Bengalis pronounce 'Rohomán', for Rahmán; 'Bokkos,' for Bakhsh.

† Of the seven known at present, four belong to Bárbakábád; one to Gaur; one to Húglí; one to the 24-Parganahs. *Vide* J. A. S. B., 1860, p. 407.

worlds, the representative of God in all lands, the king, the son of a king who was the son of a king, Shams uddunyá waddín Abul Muzaffar Yúsuf Sháh, the king, son of Bárbak Sháh the king, son of Mahmád Sháh the king—may God perpetuate his kingdom and his rule and elevate his condition and dignity!—by the Malík..... the great Lord, the hero of the period and the age..... Dated in the year 885 [A. D. 1480].

God's mercy reaches every moment the soul of a man whose pious works continue after him. [From Sa'dí's *Bostán*.]

In conclusion I shall give a few inscriptions (the only ones that have hitherto been found) belonging to the Afghán period of Bengal History (944 to 984, H., or 1538 to 1576, A. D.).

III.

THE THIRD, OR AFGHA'N, PERIOD OF THE MUHAMMADAN HISTORY OF BENGAL (1538 to 1578, A. D.).

The historical information which we possess of the Afghán period is meagre, and refers almost exclusively to matters connected with the Dihlí empire, but does not, like the history of the preceding period, conflict with mural and medallie testimony. The following is an outline of the principal events of the period.

944, 6th Zil Qa'dah, or 6th April, 1538, Gaur taken by Khawác Khán (II). Mahmúd Sháh (III) of Bengal flees to Humáyún, who has just conquered Fort Chanár.*

Humáyún marches to Bengal, and Sher Khán's generals leave Gaur unprotected.

Rise of the kingdom of Kúch Bihár under Bísá.

945 Humáyún for three months in Gaur. Mahmúd Sháh of Bengal dies at Khalgáon (Colgong). Humáyún leaves Gaur before the rains had ended (about September 1538).

He leaves Jahángír Qulí Beg as governor of Bengal in Gaur.

Khawác Khán operates against Mahárta, the Chero chief of Palámau.

946, 9th Çafar, or 26th June, 1539. Battle of Chaupsá.† Humáyún defeated by Sher Khán, who celebrates his *julús*, assumes the name of **Fari'duddi'n Abul Muzaffar Sher Sha'h**, and issues coins.

Jahángír Qulí Khán defeated by Jalál Khán and Háji Khán Batni, and soon after killed.

Khizr Khán appointed by Sher Sháh governor of Bengal.

* The siege of Chanár is said to have commenced on the 15th Sha'bán 944, or 8th January, 1538. According to the *Tárikh i Sher Sháhi* (Dowson, IV, 359), Gaur fell after the taking of Chanár. If the siege lasted six months, the 15th Sha'bán, 944 is too late a date. The year 945 commenced on 30th May, 1538.

† The river between Chaupsá and Baksar, on the right bank of which Sher Khán had encamped, is called *Thorá Nádí*.

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948 Khizr Khán deposed by Sher Sháh at Gaur. Bengal divided into districts, each under an Amír, under the *aminship* of Qází Fazílat.

952, 12th Rabi' I, or 3rd June 1545. Sher Sháh dies, and is buried at Sahasráram, South Bihár. He is succeeded by his younger son Jalál Khán, who assumes the title of **Jala'uddi'n Abul Muzaffar Isla'm Sha'h**.

Qází Fazílat, Amín of Bengal, deposed.

Muhammad Khán Súr appointed governor of Bengal and North Bihár.

Miyán Sulaimán Kararání appointed governor of South Bihár.

960 Islám Sháh dies. He is succeeded by Mubáriz Khán, son of Nizám Khán, under the title of Abul Muzaffar Muhammad 'Adil Sháh, *urf* 'Adlí.

Muhammad Khán Súr Gauriah (*i. e.*, governor of Bengal) refuses to acknowledge him, and makes himself king of Bengal.

960 to 962, **Shamsuddi'n Abul Muzaffar Muhammad Sha'h**, king of Bengal. He invades Jaunpúr, and marches on Kálpí.

962 Battle of Chhapparghattah, east of Kálpí, on the Jamuná, between 'Adlí and Muhammad Sháh of Bengal. Muhammad Sháh defeated and killed. The Bengal troops retire to Jhosí, on the left bank of the Ganges, opposite Iláhábád, where Khizr Khán, son of Muhammad Sháh, celebrates his *julús* and assumes the title of Bahádur Sháh.

962 to 968, **Baha'dur Sha'h**, king of Bengal and North Bihár.

Nara Náráyan, Rájá of Koch Bihár.

Miyán Sulaimán Kararání still holds South Bihár.

[963 Accession of Akbar.]

964 Battle near Súrajgarh, west of Munger. 'Adlí defeated and killed by Bahádur Sháh, assisted by Sulaimán Kararání.

968 Bahádur Sháh dies. He is succeeded by his brother, who assumes the title of Jalál Sháh.

968 to 971, **Ghiya'suddi'n Abul Muzaffar Jala'l Sha'h**, king of Bengal.

Sulaimán Kararání still holds South Bihár.

971 Jalál Sháh of Bengal dies. He is succeeded by his son whose name is unknown. The son is killed, and the government is usurped by one Ghiyásuddin.

971 Sulaimán Khán of South Bihár sends his elder brother Táj Khán Kararání to Gaur. He kills the usurper Ghiyás, and establishes himself in Gaur.

971 to 972, Táj Khán Kararání, governor of Bengal on the part of his brother. Dies in 972.

971 to 980, **Sulaima'n Kha'n Karara'ni'** rules over Bengal and Bihár

- 296 H. Blochmann—*History and Geography of Bengal*.—No. III. [No. 3, under the title of *Hazrat i A'la*. He removed, after Táj Khán's death, the capital from Gaur to Táñḍá. He acknowledges Akbar's suzerainty.
- 975 Sulaimán conquers Orísá. Mukund Deo, last king of Orísá, defeated and killed. Kálá Pahár takes Púri.
- 980 Sulaimán dies.
- 980 Ba'yazi'd, son of Sulaimán, king of Bengal, Bihár, and Orísá. Báyzid is murdered by Hánsú, his cousin.
- 980 to 984, Da'u'd Sha'h, second son of Sulaimán i Kararání, king of Bengal, Bihár, and Orísá. Khán Jahán Afghán appointed governor of Orísá. Qutlú Khán Lohání appointed governor of Púri.
Bál Gosáin, Rájá of Kúch Bihár.
- 982 Akbar conquers Bihár. Dáúd Sháh flees to Orísá. 20th Zí Qa'dah (3rd March, 1575), battle of Tukaroi, or Mughulmárá, north of Jalesar (Jellalore) in Orísá. Dáúd defeated by Mun'im Khán Khánkhánán and Todar Mall. Peace of Kaṭak. Dáúd cedes Bengal and Bihár, and is acknowledged by Akbar king of Orísá.
- 983 Mun'im Khán at Gaur. He dies with the greater part of his army.
Husain Qulí Khánjahán, Akbar's governor of Bengal and Bihár.
Dáúd Sháh invades Bengal.
- 984, 15th Rabí' II, or 12th July, 1576. Dáúd Sháh defeated by Husain Qulí Khánjahán in the battle of A'gmahall (Rájmahall). Dáúd is captured and beheaded.
The Afgháns withdraw to Orísá.

As in the preceding period I shall take the kings singly, and make a few remarks on the chronology and coinage of their reigns.

XXV. Fari'duddi'n Abul Muzaffar Sher Sha'h.

(944 to 952, H., or 1538 to 1545, A. D.)

Several of Sher Sháh's rupees, published by Marsden and Thomas, contain the new mint town of Sharífábád. As in the case of the mint-towns of Mahmúdábád, Fathábád, and others mentioned in this and former 'Contributions', Sharífábád may refer to the whole Sirkár, or to the royal camp in the Sirkár, and not to any particular town. There is in fact, as far as we know, no town of Sharífábád. Sher Sháh's Sharífábád refers in all probability to Bharkúndah or Western Birbhúm and the Santal Parganahs (*vide* J. A. S. B., 1873, Pt. I, p. 223).

Fort Rohtás, which plays so prominent a part in Sher Sháh's history, is not known, as Mr. Thomas states (*Chronicles*, p. 397, note) under the name of Shergarh. There is indeed, a small fort of the name of

Shergarh near Rôhtâs, about 18 miles N. W. of it; but the Shergarh of Sher Shâh's coinage stands for Kanauj.*

Sher Khân's first governor of Bengal, Khizr Khân, gave no satisfaction. He married a daughter of the late Mahmûd Shâh (III) of Bengal, and affected regal pomp and independence. His successor, Qâzi Fazilat, was an A'grah man, and seems as "Amin of Bengal" to have kept the divisional officers in check; for they gave him the nickname of Qâzi Fazîhat, or 'Mr. Justice Turpitude'.

Sher Shâh† lies buried in Sahasrâm in Bihâr. A view of the tomb will be found in Buchanan (*apud* Martin), Vol. I. I hope in a short time to publish the inscriptions.

An incidental remark in the Persian Dictionary entitled *Bahâr-i-'Ajam*, informs us that Sher Shâh wore his hair, *more gentis*, in curls. As the drying of the curls after the morning bath took some time, Sher Shâh transacted public business in the *ghusul-khânah*, the bath and dressing-room. The custom, with some modifications, was retained by the Chaghtâi emperors, during whose reigns the morning and even the evening audience-rooms were called *ghusul-khânah*.‡

XXVI. Jala'luddi'n Abul Muzaffar Isla'm Sha'h.

(952 to 960 H., or A. D. 1545 to 1553.)

The name of this king appears to have been frequently pronounced with the *imâlah*, i. e., Islâm Shâh (اسلام شاہ). Thus the name is often spelt by Badâonî, and occurs even in the Hindî orthography of Islâm Shâh's coinage.§ It is this form which has given rise to the further corruption to Salêm Shâh and Salîm Shâh.

I have followed Mr. Thomas in referring Islâm Shâh's death to the year 960, in spite of the almost unanimous assertion of the historians that he died a year later on 26th Zil Hajjah 961, or 21st November 1554.|| But Islâm Shâh's coinage goes, in uninterrupted series, only as far as 960. Suppose Islâm Shâh had died on 26th Zil Hajjah, 961. He was succeeded by his son Fîrûz Shâh, who after three days—one source says after several months—was murdered by Mubâriz Khân 'Adlî, i. e., on the 29th Zil Hajjah, so that 'Adlî could only have celebrated his *julûs* in Muharram, 962. His

* It lies close to ancient Kanauj. *Vide* Badâonî II, 94, l. 3.

† The pronunciation 'Shîr Shâh' is Iranian, and therefore not applicable to India. I have elsewhere shewn that the Muhammadans of India follow the Tûrânî pronunciation of Persian. We may be quite sure that Sher Shâh pronounced his name 'shér,' and not 'shîr'.

‡ *Vide* J. A. S. B., 1872, Pt. I, p. 66 note. This corresponds to our "levée".

§ रसेलेम. Thomas, 'Chronicles,' p. 412.

|| *Vide* Dowson IV, 505, and Badâonî.

298 H. Blochmann—*History and Geography of Bengal*.—No. III. [No. 3, coinage, however, gives 961;* and further, 'Adli had reigned for some time, when Humáyún, in Zil Hajjah, 961, entered India, and people said that if Islám Sháh had been alive, he would have opposed the Mughuls.† Islám Sháh, therefore, must have died in 960; the day of the month (26th Zil Hajjah) is very likely correct.

Islám Sháh's coinage seems to bear witness to his superstitious character. The spirit of the age, and his remarkable escapes from assassinations, perhaps inclined the king to trust to amulets. Many of his coins have the 'Seal of Solomon' and mysterious numbers, which Mr. Thomas passes over in silence, though they puzzled Marsden. What the number 477 on his coins was intended to mean, is difficult to say; it may stand for the well-known آية الله *áyat-ullah*, 'God's sign', the letters of which when added give 477.‡ I have no doubt that it resembles the famous numbers 66 (الله); 786 (بسم الله الرحمن الرحيم); 2468 (بدوح), and others, which we find used in the heading of letters, on amulets, tombs, and even mosque-inscriptions.†

Islám Sháh, too, lies, buried at Sahasráram.

XXVII. Shamsuddi'n Abul Muzaffar Muhammad Sha'h (II).

(960 to 962 H., or A. D. 1553 to 1555.)

His real name is Muhammad Khán Súr. He seems to have been appointed governor of Bengal, in supersession of Qázi Fazilat, soon after Islám Sháh's accession and to have acknowledged him as king of Bengal up to, or nearly up to, his death in 960. In 960, however, Muhammad Khán's son rebelled, as will be seen from the following curious inscription.

The Jalál Sháh Inscription from a mosque near Sherpúr Murchah, dated 960 H., or A. D. 1553.

A rubbing of this valuable inscription was received from Mr. E. V. Westmacott, C. S., who found it "at a little mosque just to the north of Sherpúr, in Bagurá." It measures 16 inch. by 9 inch.; but to both sides of the inscription are two ornaments, the upper one forming a *mimbar*, with the Musulmán creed in it; and the lower one being a little square with the words *yá allah*, 'O God', in it. The little square is surrounded by the phrase *yá fattáh*, 'O Opener', four times repeated, the alifs of the four *yá's* forming the sides of the little square. The inscription is—

* Marsden, Pl. XXXVI, No. DCCXLVIII.

† Badáoní, I, 459.

‡ Vide J. A. S. B., 1871, Pt. I., p. 257.

Mr. Thomas ('Chronicles', p. 413, in Islám Sháh's coin No. 363) gives a wrong reading, which is repeated on p. 416, No. 366. For *الحامي الدين الدنان* *alhámí-aldín-ildannán*, read *الحامي لدين الديان* *alhámí tidín-ildayyán*.

قال النبي صلى الله عليه وسلم (broken) بني... السلطان
 ابن السلطان غياث الدنيا والدين ابو العظفر جلال شاه سلطان ابن محمد شاه غازي
 خلد الله ملكه باني خير..... دعاخان ابن ... في شهر سنة ستون وتسع مئة //

The Prophet (God bless him!) said,..... [this mosque was built during the reign] of the king, the son of a king, Ghiyās uddunyā waddīn Abul Muzaḥḥar Jalāl Shāh, the king, son of Muhammad Shāh Ghāzī,—may God perpetuate his kingdom! The builder of this religious edifice is during the year 960.

There is no doubt about the date, which is expressed both in words and in numbers.

History says nothing of Jalāl Khān's rebellion or the course it ran; all we know is that Jalāl Khān nine years later was acknowledged king of Bengal. The following passage from Badāonī (I, 430) is rather curious, because the name of Jalāl Shāh is transferred to the father, who on, or before, 'Adlī's accession refused allegiance, made himself king of Bengal under the name of Muhammad Shāh, and even aspired to the throne of Dihlī.

In the meantime Hīmūn heard that Muhammad Khān Sūr, the governor of Bengal, had made himself king under the title of Jalāluddīn, and had come with an army resembling swarms of locusts and ants, from Bengal to Jaunpūr, and was marching upon Kālpī and Āgrah. * * * And when Hīmūn in uninterrupted marches moved to 'Adlī, he found 'Adlī and Muhammad Khān of Gaur near the Mauza' of Chhapparghaṭṭah, 15 kos from Kālpī, with the Jamunā between them, ready to fight each other. He of Gaur lay encamped with great pomp, much war material, with numerous horse, foot, and countless elephants, and quite confident as to 'Adlī's fate. But suddenly the scales turned: Hīmūn arrived like a shooting star, and without delay sent his choice elephants through the river, attacked the negligent Bengal army by night, and threw it into utter confusion and disorder. Most of Muhammad Khān's Amīrs were killed, others escaped, and the helpless king of Gaur, evidently with his head in his sleeve, disappeared, and up to the present nothing is known about his fate.

As we have specimens of Muhammad Shah's coinage, we know that he did not call himself 'Jalāl Shāh'; but Badāonī may have heard of the rebellion of his son and confounded Jalāl Shāh with Muhammad Shāh.

The village of Chhapparghaṭṭah (چھپرگھٹہ)—perhaps the most westerly point to which the Bengal arms ever advanced—lies east of Kālpī, on the left bank of the Jamunā, in Long. 79° 58', close to the confluence of the Sīngūr Nadi and the Jamunā. It belongs to Parganah Ghātampūr, Sirkār Korrá. Though prominently marked on maps X and XIII of Rennell's Atlas, it is not given on Sheet 69 of the 'Indian Atlas', the nearest place (if not the same) being Sultānpūr. A little further to the east, at the entrance of the Itāwah Terminal Ganges Canal into the Jamunā, lies the village of Fathābād, and nearer still to Chhapparghaṭṭah, the village of Fathpūr. Either may have been the actual site of the battle-field.*

* The straight distance of Chhapparghaṭṭah from Kālpī is only 11 miles. Fathpūr

Marsden gives a fine specimen of Muhammad Sháh's coinage, dated 962, which gives the full name of the king; but he makes the name of the mint town to be Arkát. I have no doubt that the correct reading is Sunárgáon.

XXVIII. Baha'dur Sha'h (II).

(962 to 968 H., or A. D. 1555 to 1561.)

His full name is not known to me: the coins which I have seen, had their margin cut away. Badáoní (I, 433) calls him Muhammad Bahádur. The period of his reign appears to be well ascertained; the historians give 962 to 968, and General Cunningham tells me that he has coins of 965, 967, and 968.

Parganahs Bahádurpúr and Bahádur Sháhi in Sirkár Tánjá, appear to be called after him. The Sirkár bears unmistakeable traces of financial changes made during the Afghán period; for, besides Bahádurpúr and Bahádursháhi, we have Sherpúr and Sher Sháhi, Sulaimánábád and Sulaimánsháhi, and Dáúdsháhi.

The most important event in Bahádur Sháh's reign is his war with 'Adlí. Driven out of Ágrah, Itáwah, and Kálpí, and having lost his great general Hímún, 'Adlí retreated to Jaunpúr, Banáras, and Fort Chanár, and eventually to South Bihár, which since Islám Sháh's reign had been held by Miyán Sulaimán Kararání. Bahádur Sháh, who after the death of his father and the rout at Chhapparghattah, had retired to Jhosí, opposite Iláhábád, on the left bank of the Ganges, where he celebrated his *julás*, hastened to Gaur and defeated an officer of the name of Shahbáz Khán, who had declared for 'Adlí. Having firmly established himself in Bengal, he wisely left Miyán Sulaimán in possession of South Bihár, and thus found him a willing ally when he marched against 'Adlí, anxious to avenge the death of his father. The decisive battle, according to the *Tárikh i Dáúdí*, was fought "at the stream of Súrajgarh, near Munger". The stream of Súrajgarh is the Kiyol Nadí, and Súrajgarh stands at the confluence of the Kiyol and the Ganges, 17 miles W. W. S. of Munger. About 4 miles west of Súrajgarh and the Kiyol, we find on Sheet 112 of the Indian

is 15 miles. The *Tárikh i Dáúdí* (Dowson IV, 507) says that Chhapparghattah lies 11 kos from Kálpí. The *Tabaqát i Akbari* (Dowson V, 245) has 15 kos from Ágrah, which is impossible.

In Dowson V, 244, l. 20, for Sikandar Khán, ruler of Bengal, read Muhammad Khán Súr, ruler of Bengal; and for the village of Mandákar [Dowson, IV, 507, 'Marhákhur'], read the village of Minda'kur, or Minda'kur. Minda'kur, the Mirha-koor of the maps, lies W. of Ágrah, towards Fathpúr Sikrí. It belonged to Sultán Salimah Begam (Bairam Khán's widow married by Akbar), who lies buried there in her garden. *Tuzuk*, p. 113.

1875.] H. Blochmann—*History and Geography of Bengal*.—No. III. 301

Atlas the village of Fathpúr, which may be the site of the battle-field. 'Adli, who had only a few men, was defeated and killed.

The battle was fought while Akbar besieged Mánkoṭ in the Siwálíks, i. e. in 964, and brought about the final surrender of that fort.*

Bahádur Sháh died in 968 at Gaur, and was succeeded by his brother Jalál Sháh.

The following inscription belongs to Bahádur Sháh's reign—

Inscription from the Jámí' Mosque at Rájmahall, dated 964, H., or A. D. 1557.

A rubbing of this inscription was sent to the Society in 1873 by General Cunningham. Another copy was since then given me by Mr. W. Bourke, together with three other inscriptions from Rájmahall.† The inscription has nothing to do with the mosque, and appears to have been taken from the tomb of one Qázi Ibráhím Khán, who was murdered by infidels when young. It is very illegible, and the letters are badly cut. Its length is 3 ft. 3 inch., and its breadth, 6½ inch.

قال الله تبارك وتعالى و لا تقولوا لمن يقتل في سبيل الله اموات بل احياء و لكن لا تشعرون * و قال الله عز و جل و من يهاجر في سبيل الله يجد في الارض مزاغما كثيرا وسعة و من يخرج من بيته مهاجرا الى الله و رسوله ثم يدركه الموت فقد وقع اجرة على الله *
 (3 lines illegible) ... فهم از زبانها بلغا بتقرير آن عاجز و اقلام علماء دوران بتحرير مثل قاضي عالى المنصوص بمرتبت عايداي شان جليل البرهان سند علما ابراهيم خان غازي بن امين الله .. كه در
 استقامت بود و در عهد جواني اوان عذوقان مسلمانني مقاتل كفار و دافع شر و فساد سنة اربع و ستين و تسع مائة بتاريخ ٨ ماه سارون روز جمعه

* There is no doubt about the date. The *Tárikh i Dáulí* (Dowson IV, 508) places "Súrajgarh one kos, more or less, from Munger", and adds that 'Adli was slain "after a reign of eight years in 968." Badáoní (I, 434) places the death of 'Adli in 962. Vide also Dowson, V, p. 66.

† General Cunningham calls the mosque 'Jámí' Mosque'; Mr. Bourke, 'Asám Sáis kí Masjid.' The other rubbings which Mr. Bourke gave me, are (1) a beautiful rubbing from Mainá Bībī's tomb, at the Mainá Taláo, from a stone let into the wall at the west end. This inscription only contains pious formulæ; but its beautiful characters belong to the 14th century. (2) A rubbing from a mosque, south of the new cemetery in Rájmahall. The inscription is over the centre door, and belongs to the reign of Aurangzib. (3) A rubbing from a mosque in Mahatpúr, three miles east of Rájmahall, dated A. H. 1081 (Aurangzib's reign).

بوقت در نیم پاس بقشرف شهادت و طریق هدایت متشرف آمدند
و بصحبت ملایان در رهبری مصطفوی واصل آن بارگاه مطلوبیت ..
.....(1 or 2 lines broken).....

God who is blessed and great says [Qor. II, 149], 'Do not say that those who are killed on the way of God are dead: they live, but you do not know.' And God who is honored and glorious, says [Qor. IV, 101], 'He who fleeth on the path of God, will find on earth many (similarly) compelled and plenty of provisions. And he who leaves his house fleeing to God and His Prophet, and death overtake him, his reward becomes the duty of God.' as to his understanding, the tongues of the eloquent are unfit to express it, and the pens of the learned of the age wither away in attempting a description, the exalted Qāzī, who exalted dignity is manifest, the illustrious witness, the proof of the learned, Ibrāhīm Khān Ghāzī, son of Amīnullah, who was in a teacher, who in the beginning of his youth and the beginning of his faith fought with the infidels and repelled mischief and rebellion, was admitted in 964, on the 8th day of Sāwan, a Friday, when two and a half watches had passed, to the honor of martyrdom and the road of guidance, and joined, through the society of the Mullās in the guidance of the Prophet, that throne of wishes.

XXIX. Ghiya'suddi'n Abul Muzaffar Jalāl Sha'h.

(968 to 971 H.; A. D. 1561 to 1563.)

I take his full name from Mr. Westmacott's Sherpūr Inscription given above, as there is no doubt that he is the same prince. Of his coins, Mr. Thomas ('Chronicles,' p. 417) has published a fine specimen, on which he appears with the shortened name of Jalāldīn.* Mr. Thomas makes the mint-town to be Jājpur; I believe that the correct reading is Hājīpūr (opposite Patnah). Already under Nuṣrat Shāh, Hājīpūr had risen to importance as the seat of the Bengal governor of Bihār. The southern part of Bihār, with the town of Bihār as capital, was in the hands of the Afghāns. This state of things continued during the reigns of Islām Shāh and the Afghān dynasty of Gaur, South Bihār being in the hands of Miyān Sulaimān i Kararānī. Some time after Akbar's conquest of Bihār, Hājīpūr gradually sank in importance, and Patnah† became the seat of the Mughul (Chaghtāi) government.

Jalāl Shāh is said to have died in 971 at Gaur. For the events after his death, the murder of his son, and the short-lived government of the usurper Ghiyā'suddīn, we have no other source but the modern *Riyāz ussālātīn*, the author of which has not mentioned the source of his information. He has, however, been occasionally found possessed of special and correct information, and we may follow Stewart in accepting his statement.

With Jalāl Shāh and his son ended the Sūr dynasty.

* Just as 'Jamāldīn' in the Sātgaon inscription of 936, published by me in J. A. S. B., 1870, Pt. I, p. 298.

† Sher Shāh built the Fort of Patnah. In Todar Mall's rentroll, Patnah belongs to Sirkār Bihār.

XXX. Hazrat i A'la Miya'n Sulaima'n.

(972 to 980, H., or A. D. 1564 to 1572.)

The principal facts of the vigorous reign of Miyán Sulaimán are known from the *Tárikh i Dáúdí* (Dowson, IV, 509) and the *Akbarnámah*.

His piety made a certain impression on Akbar, and Badáoní states that he used to hold every morning a devotional meeting in company with one hundred and fifty Shaikhs and 'Ulamás, after which he used to transact state business.

His redoubtable general Rájú, better known as Kálá Pahár, is up to this time remembered by the people of Orísá.

According to the *Akbarnámah* and *Badáoní*, his death took place in 980. This must have been in the beginning of the year; for Dáúd's coinage commences likewise with 980. The *Riyáz* and Stewart have 981.

The following two inscriptions from the extreme ends of his dominions, Sunárgáon and Bihár, are of value.

1.—*The Sulaimán Sháh Inscription of Sunárgáon, dated 976 H., or A. D. 1569.*

General Cunningham took a rubbing of this inscription from a stone at the old Masjid near the Rikábí Bázár, Sunárgáon. The stone measures 1 ft. 6 in. by 1 ft. 3 in., and consists of three lines. The characters are clumsy and indistinct.

قال الله تعالى ان المساجد لله فلا تدعوا مع الله احدا قال النبي
عليه السلام من بني مسجدا في الدنيا بني الله له سبعين قصورا في
الجنة * هذه المساجد مع ما من المقام في عهد سلطان الزمان حضرت
اعلي ميان سليمان المكرم المعظم المظفر الملك عبد الله ميان
بن امين خان فقير ميان في التاريخ من شهر ذي القعدة سنة ست و
سبعين و تسعمائة ||

God Almighty says, 'The mosques belong to God, worship no one else with him.' The Prophet, on whom be peace, says, 'He who builds a mosque in the world will have seventy castles built for him by God in paradise.' These mosques together with what there is of other buildings [were built] during the reign of the king of the age, his august Majesty,* Miyán Sulaimán....[by] the generous, exalted, victorious Malik 'Abdullah Miyán, son of Amír Khán Faqír Miyán, during the month of Zil Qa'dah 976 [April, 1569].

2.—*The Sulaimán Sháh Inscription at Bihár, A. H. 977, or A. D. 1569-70.*

The following inscription is taken from above the door leading to the minor tomb of the shrine of Sharafuddín in the town of Bihár.

* *Hazrat i A'la*. Sulaimán claimed this title; *vide* Kín Translation, Vol. I, p. 337, and Index. The *Tárikh i Dáúdí* also calls him *Miyán* Sulaimán.

در شرف جهان قطب اقطاب * قبله حاجات ارباب
 برین در هر که آید نیک باید * ز حق حاجت که خواهد نیلک یابد
 ادیم خلوتش سبز زمین است * ازان رو خازن دنیا و دین است
 بعهد شاه عادل مظهر نور * که ظلم و کفر گشت از هیبتش دور
 کجا اعلام عالی او بیفراخت * شریعت مصطفی معمر می ساخت
 سلیمان جهان ثانی سلیمان * جمال او کمال از عدل و احسان
 ز نه صد هفت و هفتادش فزون بود * نبوشت از حسو ابن داؤد

1. The door of honor of the world, and the pole of poles, the cynosure of devotees;

2. He who comes to this door, will indeed obtain from God his desires; for he who wishes, finds.

3. The leather carpet of his retiring room is the green ground; and for this reason he is the treasurer of the world and the faith.

4. In the reign of the just king, in whom heavenly light is revealed, through whose terror oppression and heresy disappeared,

5. Wherever he raised his exalted standards, he established the law of Muṭṭafā,

6. Sulaimán, of the world, a second Sulaimán, whose beauty lies in the perfection of his justice and bounty.

7. When 900 had been exceeded by 77 years, Hassá, the son of Dáúd, wrote it.

At the side of this inscription, the poetry and prosody of which is as wretched as those of the Bihár inscriptions formerly published, stands the 256th verse of the second chapter of the Qorán.

XXXI. Ba'yazi'd Sha'h (II).

(980 H., or A. D. 1572.)

Regarding the death of Sulaimán and the accession of Báyzid Sháh, Badáoní (II, 163) says—

"In this year (980) Sulaimán i Kararánī, the ruler of Bengal, who styled himself *Hazrat i A'la*, died. He had conquered the town of Katak-Banáras, 'the mine of unbelief', and had made Jagannáth [Pári] a *dár-ul Islám*. He ruled from Kámrúp to Orísá, and now went to God.

"His son Báyzid took his place; but after five or six months the Afgháns killed him, and his younger brother Dáúd seized on the kingdom."

The *Sawánih i Akbari* has the following—

Sulaimán during his lifetime had constantly sent presents to the emperor Akbar, and had thus secured himself against an invasion. When he died, the Afgháns thought it proper to make his eldest son Báyzid his successor. He, in his youthful folly, read the *khutbah* in his own [not in Akbar's] name, and neglected all the forms of politeness which his father had always strictly observed. Even the chief nobles of his father were ill-treated by him, and commenced to hate him. Háqsú [هاسو] also, son of his uncle 'Imád [brother of Táji Khán and Sulaimán], who was his son-in-law, got offended with him, and was instigated to seize the kingdom, till at last he killed Báyzid.

But Lodí, who was 'the soul' of the kingdom, with the consent of the nobles, raised Dáúd, the younger son of Sulaimán, to the throne and killed Háqsú. But Gújar Khán raised in Bihár Báyzíd's son to the throne, and Lodí went with a large army to seize on Bihár. On account of carelessness on the part of Mun'im Khán Khánkhánán, and by means of flattering promises, Lodí succeeded in bringing Gújar over to his views.*

As Sulaimán died in 980, and Dáúd Sháh's coinage begins also in 980, Báyzíd Sháh's short reign falls in the same year. No specimen of his coinage has hitherto been found.

XXXII. Abul Muzaffar Da'u'd Sha'h.

(980 to 984 H.; A. D. 1573 to 1576.)

The facts of Dáúd Sháh's reign are well known from the histories of Akbar's reign. His full name appears on the margin of his coinage, of which specimens are numerous; but all rupees that I have seen, had the margin cut away.

His defeat on the 15th Rabí' II, 984 [12th July, 1576] elicited the curious *tárikh* (metre *Sarí'*†)—ملك سليمان از داود رفت

Solomon's kingdom slipped from David's hand.

With Dáúd Khán the Kararání dynasty came to an end. The Afgháns under the Lohánis subsequently fought with Akbar's officers, especially Mán Singh, in Orísá and South-Eastern Bengal, till they were finally overcome under 'Usmán Khán during Jahángír's reign in Eastern Bengal.‡

The frontiers of Bengal during the Afghán period became gradually narrower. Sunárgáoṇ is mentioned as the frontier under Sher Sháh and Sulaimán i Kararání. But this may have been more nominal than real. Chát-gáoṇ had already before Sher Sháh again fallen in the hands of the Arakanese. The Bhúyahs, *i. e.* zamindárs, of Bhaluah, Baklá, Chandradip, Farídpúr, and the 24-Parganahs, were all but independent; and from Sunárgáoṇ over Dháká northward over Maimansingh extended the territory of Masnad i 'A'li 'I'sá Khán, who in the Akbarnámah is called 'the chief of the Twelve Bhúyahs'. The Portuguese also became important.

In the north, the frontier receded likewise. The results of the conquest of Kámatá and Kámrúp by Husain Sháh vanished with the establishment of the great kingdom of Kúch Bihár, when the Karataya became again the frontier. The Muhammadan historians do not tell us much

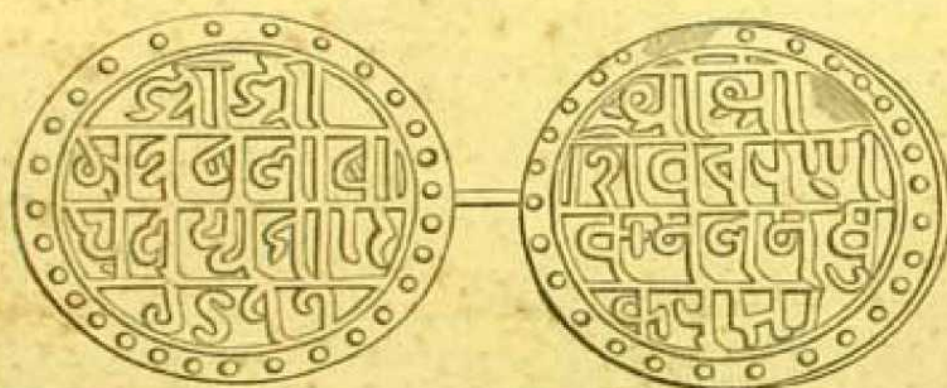
* The remaining portion has been translated by Prof. Dowson in Elliot's *History of India*, VI, p. 39 ff.

† Vide my 'Prosody of the Persians', p. 59, l. 13. The second foot is *maf'álan*, and the *alif* in *az* cannot be left out.

‡ Vide Aín Translation, I, 520, 521. Prof. Dowson, IV, 513n., makes 'Usmán Khán Dáúd's younger brother. But they belong to different Afghán tribes.

regarding the rise of this kingdom. According to the *Akbarnámah*, the founder was Bísá, who must have lived in the very end of the second period of the Muhammadan history of Bengal, (*i. e.* about 944 H., or A. D. 1538), or fifty years* before Abul Fazl wrote. His son Nara Náráyan is not mentioned; but his coins prove that he was the contemporary of 'Adlí. A specimen of his silver coinage was published in J. A. S. B., for 1856, p. 457, by Bábu Rájendralála Mitra, and bears the Sáka year 1477, or A. D. 1555. A short time ago, Capt. Williamson, Deputy Commissioner, Gáro Hills, presented the Society with the following unique silver coin, which is of the same year, but is much larger than the one published by Bábu Rájendralála Mitra, and differs in the legend of the reverse. It was picked up by a Gáro together with a Dáúdsháhi rupee.

Silver Coin of NARA NA'RA'YANA of Kúch Bihár. Large size. Weight, 157.49 grains. Sáka 1477 [A. D. 1555]. As. Socy., Bengal. Dotted margin.



OBVERSE—श्रीशिवचरणकमलमधुकरस्य

REVERSE—श्रीश्रीमन्नरनारायणस्य शके १४७७ ॥

OBVERSE—(The coin) of the bee of the lotus of the foot of the twice illustrious Sivá,

REVERSE—Of the twice illustrious Nara Náráyana. Sáka, 1477.

Nara Náráyan's son and successor was Bál Gosáin, whom the *Akbarnámah* calls Bísá's grandson. He was reigning in 986, or A. D. 1578. His brother Shukl Gosáin is mentioned by Abul Fazl and Ralph Fitch. Bál Gosáin's son is Lachmí Náráyan, who received Mán Singh in 1005 H., and was still reigning in 1027 (A. D. 1618).

* *Vide* J. A. S. B., 1872, Pt. I, p. 52, l. 8 from below. It is quite possible that the rise of Kúch Bihár is connected with the fall of Gaur.



Group I.





BACCHANALIAN SCULPTURE FROM KUKARGAMA, DISTRICT MATHURA.



BUDDHIST BACCHANALIAN SCULPTURE FROM MATHURÁ, N. W. P.

S. Sedgfield Lith.

(From a drawing)

Calcutta.

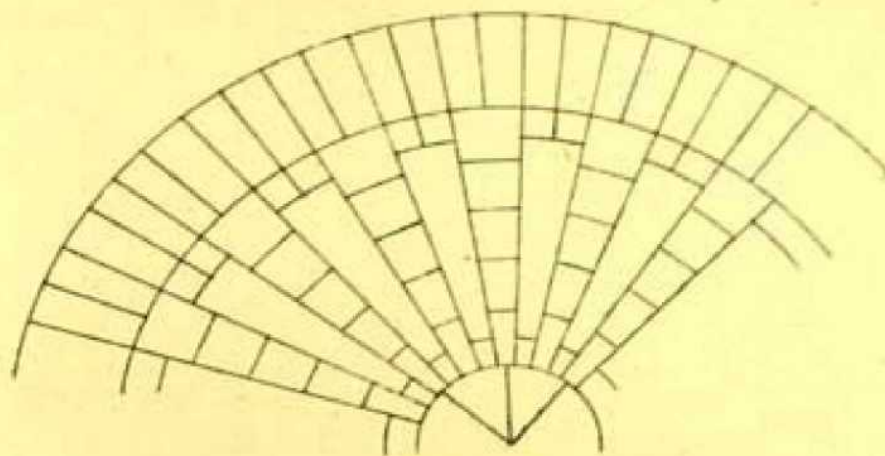


Fig: 15

SĀRĀRATHACHAKRACHIT
(second layer)

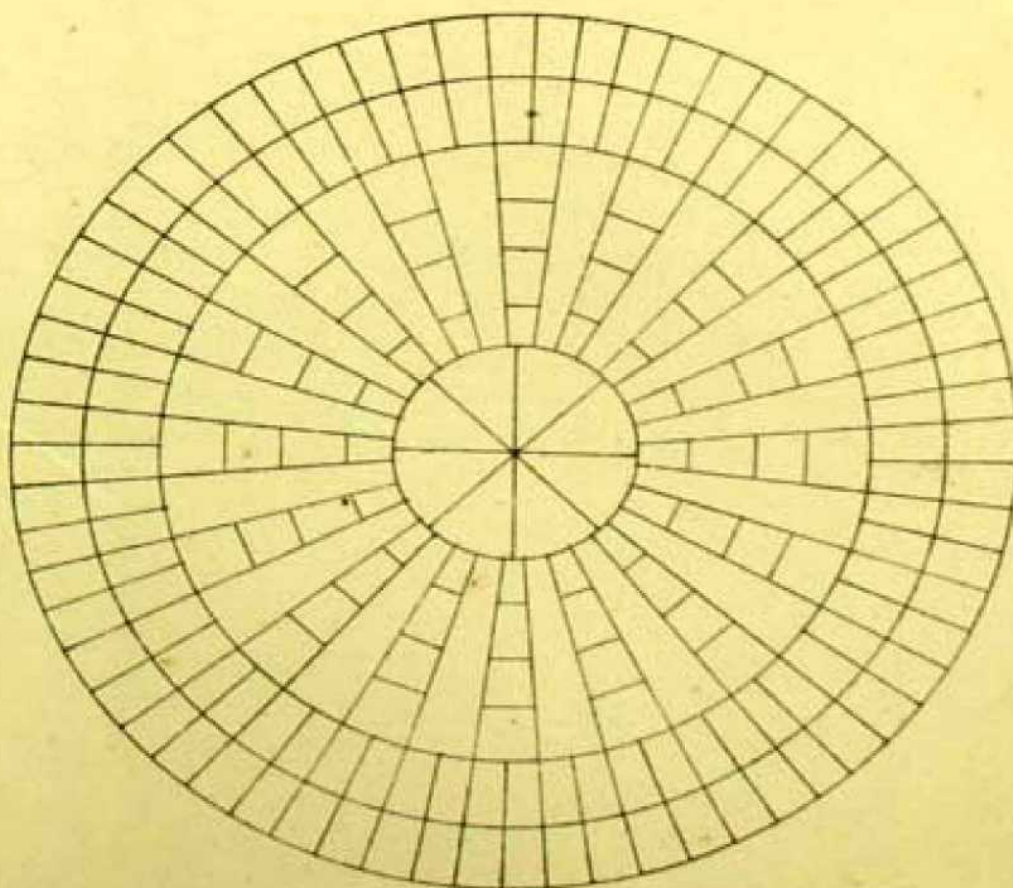


Fig: 14

SĀRĀRATHACHAKRACHIT
(first layer)

JOURNAL

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Part I.—HISTORY, LITERATURE, &c.

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No. IV.—1873.

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Rough Notes on the Angámi Nágás and their Language.—By Captain
JOHN BUTLER, B. S. C., Political Agent, Nágá Hills, Asám.

(With seven plates.)

Introduction.

Of all the numerous tribes—Gáros, Khásias, Sintengs, Mikirs, Kacháris, Kúkís, Nágás, Singphús, and Khám-tis—inhabiting that vast tract of mountainous country which hems in Asám on the south, the largest numerically, as it is territorially, is the “Nágá”. Under this comprehensive term is included the whole group of cognate races, dwelling along that broad stretch of hill and upland, which, roughly speaking, is comprised between the Kopili River, on the west, and the Bori Dihing, on the east, and which lies between the parallels of 93° and 96° East Longitude. This tract extends northwards to the low hills bordering the alluvial plains of the Districts of Lakhimpúr, Síbságór, and Náogáon, and overlooks the broad waters of that noblest of all Indian Rivers, the sacred Brahmaputra. In a southerly direction, we are at present unable to state exactly to what limit it may extend. We may, however, safely say that it lies between the meridians of 25° and 27° North Latitude. Our late explorations have clearly ascertained, that the great Nágá race does undoubtedly cross over the main watershed dividing the waters which flow north into the Brahmaputra, from those flowing south into the Iráwadí; and they have also furnished very strong grounds for believing that in all probability it extends as far as the banks of the Kaiendwen (Námtonái or Ningthi) River, the great western tributary of the Iráwadí. Indeed there is room even to believe, that further-explorations may, ere long, lead us to discover, that

the Kakhyen and Khyen (often pronounced Kachin and Chin) tribes, spoken of by former writers (Pemberton, Yule, Hannay, Bayfield, Griffiths, and others) are but offshoots of this one great race. Yule tells us that "the hills west of Kalé are occupied by the Khyens, a race extending southward throughout the long range of the Yúma-doung to the latitude of Prome", and that "Colonel Hannay identifies the Khyens with the Nágas of the Asám mountains." Again Dalton in his work on the Ethnology of Bengal tells us that "Karens are sometimes called Kakhyens", and that "Latham thinks that word for word Khyen is Karen", whilst Dr. Mason tells us "that it is a Burmese word signifying aboriginal". Finally we have Major Fryer informing us in his late interesting paper "On the Khyen people of the Sandoway District"*, that the Khyengs have a tradition that they came down many years ago from the sources of the Kaiendwen River. It will thus be seen that the question regarding the identity of these tribes is at present a difficult one to decide, and I consider that its final solution can be satisfactorily undertaken only when we have completed the explorations upon which we have been so busily engaged for the last six years. We have already succeeded in completing the survey of about 8000 square miles of a country, about which we previously knew scarcely anything at all, a *terra incognita* in fact, the greater portion of which had been unseen by European eyes until visited by those enterprising pioneers, our survey officers, who armed with the Theodolite and Plane-table very soon cleared away the huge blots which had for so long been permitted to disfigure our N. E. Frontier Maps. Thus it is obvious that any theory propounded at the present stage of our knowledge must be more or less based upon conjecture, a dangerous field of controversy which I wish to avoid, especially as a few more seasons of such work as we have done of late, must clear up the mystery in which this question has so long been shrouded.

CHAPTER I.

Geography and History.

Of all the tribes—and they are almost as numerous as the hills they inhabit—into which the Nágá group is divided, the most powerful and warlike, as it is also the most enterprising, intelligent, and civilized, so to say, is the "turbulent Angámi". This great division of the Nágá race occupies for the most part a charming country of fine, open, rolling hill and valley, bounded by lofty mountains, some of whose summits tower up to nine, ten, and even twelve thousand feet above the sea level. Their villages are generally placed on the more tabular hills of about 5000 feet elevation, and enjoy

* Journal, As. Socy. Bengal, for 1875, Pt. I, p. 39.

a healthy, bracing climate, subject to neither extreme heat, nor cold. This noble tract of country is blessed with a most fertile soil, well cultivated, drained and manured, and the hill sides are often covered, I might almost say for miles, with a succession of fine terraces of rich rice; and the hill tops are dotted over, as far as the eye can reach, with numerous large villages, whose comparatively enormous population might even claim for them the right of being called towns. Thus Kohima for instance contains no less than 865 houses, or say a population of over 4000 souls.

The Angámis proper, or "Western Angámis", as they have also been aptly termed, in order to distinguish them from the Eastern clans, to whom they are closely allied, hold 46 villages, all lying to the west of the Sijjo or Doiáng River. Towards the north they extend up to the range of hills on which the Nidzúkhru mountain forms a prominent landmark, and on the west to the low range of hills on which Samagúting, Sitekema, and Nidzúma stand, whilst towards the south they are cut off from Manipur by the lofty Barrail, whose forest-clad heights make a splendid background to the lovely panorama in front. The 46 villages above-mentioned, contain a total of 6,367 houses, and cover a tract of about 30 miles in length, by about 20 in breadth, and are thus spread over an area of about 600 square miles. Now if we allow an average of 5 souls to each house, we here obtain a population of 31,835 souls, or roughly, in round numbers, say about 30,000 souls—figures which I believe a regular census would prove to be very near the mark indeed. And from these figures we may assume that we have here got a population of at least 50 to the square mile, which for a hill country, I need hardly add, is a very large average. This can be easily seen by a reference to the last Census Report of Bengal (1872), in which we find that even the Khásia Hills have only 23 souls to the square mile, the Chittagong Hill Tracts only 10, whilst Hill Tiparah comes last of all with only 9.

I may here explain that the total area of all "Nágá Land" *theoretically* under the political control of our Government is about 8,500 square miles, and I have roughly estimated the population in that area to be at least 300,000 souls.

It has been generally believed that the term "Nágá" is derived from the Bengali word "nángtá", or the Hindustani word "nangá", meaning "naked", and the specific name "Angámi" has also been credited with the same source. Another theory suggests the Kachári word "Nágá", a "young man" and hence a "warrior", whilst a third theory would derive it from "nág" a snake. However, be this as it may, the term is quite foreign to the people themselves: they have no generic term applicable to the whole race, but use specific names for each particular group of villages; thus the men of Mezoma, Khonomá, Kohima, Jotsoma, and their



allies call themselves *Tengimás*, whilst others if asked who they are would reply simply that they were men of such a village, and seem to be quite ignorant of any distinctive tribal name connecting them to any particular group of villages,—a strange fact, which I think is in a great measure accounted for by the state of constant war, and consequent isolation, in which they live. The *Kacháris*, I may add, speak of the *Nágás* generally as the *Magamsá*, and of the *Angámi Nágás* in particular as the *Dawánsá*.

I have long endeavoured to gain some satisfactory information regarding the origin of these interesting tribes, but I regret to say that this is a question upon which I have hitherto failed to throw much light. In my wanderings to and fro, I have observed that there seem to be two very distinct types running through these hills; the one a fine, stalwart, cheerful, bright, light coloured race, cultivating their, generally terraced, lands, with much skill, among whom I place the *Angámi* as *facile princeps*; the other a darker, dirtier, and more squat race, among whom the sulky *Lhotá* may be pointed to as a good representative; and I have not failed to notice signs that the latter are giving way to the former, wherever they happen to come in contact. A careful comparison of the several dialects which I have long been busy collecting, will, I fancy, be one of the best guides we can obtain for the proper classification of all these tribes, but that is a matter of time, and the compilation of a vocabulary with any pretension to correctness is far from being the easy task some imagine it to be.

The *Angámis* have a tradition that they originally came from the south-east, and a fabulous legend goes on to relate how "a long time ago" when the world was young, and gods, men, and beasts dwelt in peace, a god, a man, a woman, and a tiger lived together; how the woman died, and the tiger attempted to make a meal of her; how this led to the breaking up of this happy family, and the separation of these incongruous creatures. Afterwards a quarrel arose between two brothers, the sons of their great Chief, and they then both left the cradle of their race, each taking a different path, the one "blazed" his path by cutting marks on all the "*Chomhú*" trees, the other on all the "*Chémú*" trees. Now the former always remaining white and fresh for many days, and the latter turning black almost immediately, the greater following took the former path, which led them out into the plains of *Asám*, the latter and lesser number settled in the hills, and hence the numerical superiority of the "*Tephimás*" or "*Tephrimás*" (men of *Asám*). This is the outline of a very long disconnected narrative of their exodus, and it is not very flattering to be told that another equally wild legend ascribes the genesis of the "white faces" to a white dog and a woman, extraordinarily fair, who were floated off, amid

broad waters on a raft, well provisioned for a long voyage. These creatures are believed to have landed on some distant shore, and the result was a race of white men, who bred and multiplied until they overran the land, conquering all black races that attempted to oppose their onward progress. This tale does not at first sight appear to credit us with a very noble origin, but the fact is I believe that the "white dog" has been merely introduced as a sort of *Deus ex machina*, in order to account in some way for some of our, to them, most extraordinary powers.

I find it recorded in an old letter dated thirteen years ago, that "about 300 years since, the younger brother of the then reigning Rájá of Jaintiá, became enamoured of his niece (the Rájá's daughter) and forcibly seizing her fled with some followers from Jaintiá to Dimápur, then the residence of the Kachár Rájás. Here he remained for some time protected by the Kachár Rájá; but his brother having sent out a large force to capture him, he fled to the hills in the vicinity of Dimápur, now known to us as the Angami Hills, and being accompanied by several Kacháris, as well as his own followers, permanently established himself there, and from this colony arose the now powerful tribe of the Angami Nágas." This account is reported to have been received "from an intelligent hill Kachári", who is said to have further stated that full confirmation of these facts might be gleaned from some of the old Jaintiá records; and as a further argument to support his story, he is also said to have pointed to the fact that the Angami women to this day adhere to the peculiar manner of wearing the cloth tied above each shoulder, adopted by the Jaintiá women alone of all the other tribes on this frontier. For my own part I have never succeeded in obtaining any confirmation of this strange story, and am hence sceptical of its truth. However, I have deemed it right to give it *quan. val.*, in the hope that some future investigator may possibly be able to pick up a clue to the story in fields where I have not had the opportunity of searching, namely amid the archives of Jaintiápur.

Our first actual acquaintance with the Angamis appears to have commenced as early as 1831-32, when Captains Jenkins, Pemberton, and Gordon were deputed to explore a route through their country, with a view to opening out direct communication between Asám and Manipur. On this occasion, although they were accompanied by a comparatively large force, amounting to no less than 700 muskets, they were opposed with a most determined resistance at every village they passed through, and so bitter was the opposition made, that in many instances the villagers set fire to their own villages, so as to destroy such provisions as they were unable to remove rather than allow them to fall into the hands of the enemy. From the date of that eventful journey until 1867, that is to say, for a period of over forty years, the political history of our relations with this

tribe has been one long, sickening story of open insults and defiance, bold outrages, and cold-blooded murders on the one side, and long-suffering forbearance, forgiveness, concession, and unlooked-for favours on the other, varied now and again with tours innumerable, deputations and expeditions, the interesting details of which go far to make up one of the most important chapters of the yet unwritten history of a province, rich in such stores, but which it would be out of place, if not impossible, to allude to within the limits of this paper.

With regard, however, to the effect of punitive military expeditions when unaccompanied with, or followed by, other measures of a more lasting nature, such as the actual occupation of the country, whether it be to exercise absolute authority or mere political control, I may here briefly draw attention to the Nágá expedition of 1850, when a force of over 500 men, with 2 three-pounder guns and 2 mortars, and European Officers in proportion, was thrown into the Nágá Hills, to avenge a long series of raids, which had finally culminated in the murder of Bhog Chand, the native officer in command of our outpost at Samagúting. This Force entered the hills in November 1850, and although they very soon drove the Nágas out of their stockades, a portion of the Force remained in the hills until March 1851, when our Government, loath to increase its responsibilities, determined to abstain, entirely and unreservedly, from all further interference, with the affairs of the Nágas, and withdrew our troops. In the remaining nine months of that year no fewer than 22 raids were made on our frontier, in which 55 persons were killed, 10 wounded, and 113 were carried off into a captivity from which very few indeed ever returned. In 1853, the Government consented to the appointment of a European Officer to the charge of North Kachár. A station was taken up at Asálú, which was then formed into a separate subdivision, subordinate to Náogáon, and stringent orders were issued, forbidding any interference with the Hill Tribes: the Dhansiri was accepted as the extreme limit of our jurisdiction, and the Angamis were henceforth to be treated as altogether beyond our pale. These measures had the effect, as might easily have been anticipated, of simply temporising with the evils which they were meant to eradicate, and hence we can scarcely be surprised to find that raid followed raid, with a monotonous regularity, which all our frontier posts were completely helpless to prevent. Thus between the years 1852 and 1862 we hear of twenty-four such atrocities being committed within the vaunted line of our outposts, and some of them were accompanied with a tigerish brutality, so intensely fiendish, that it is almost incredible that such acts could have been perpetrated by human beings, savages though they were. In 1862, three distinct attacks were made upon our subjects within the short space of twenty-four days. In the first of these, at Borpothar, a Sepoy

was cut down in broad daylight, within a few paces of a Masonry Guard House, filled with an armed detachment of his companions. In the second, six out of seven elephant-hunters were cruelly massacred; and in the third, a village almost within hail, and certainly within sight, of the Guard House above-mentioned, was attacked and plundered at about 9 A. M., eight persons being killed on the spot, and two children carried off, one of whom the Nágás subsequently cut to pieces on their retreat, on finding themselves pursued. At this juncture, we find our local officers frankly declaring that our relations with the Nágás could not possibly be on a worse footing than they were then, and that the non-interference policy, which sounds so excellent in theory, had utterly failed in practice, and urging therefore that it was necessary to adopt more vigorous measures. Yet notwithstanding much correspondence that passed upon the subject, when all kinds of schemes, possible and impossible, were discussed and re-discussed, nothing more appears to have been done until 1865. In this year, a recurrence of fresh forays led the officer in charge of North Kachár to represent that the safety of his sub-division was in jeopardy, and it was then that the Government were at last moved into giving their consent to the deputation of an European officer who was to effect a permanent lodgment in the country; and Samagúting (or more properly Chimukedimá) was again occupied by us in December 1867. Since the date of this measure being carried into effect, our chief object here, namely, the protection of our lowland subjects, has been most completely attained, and I think I may safely say, that the prestige of our Government was never held in higher esteem by our turbulent highlanders than it is at the present moment. This result is due, in a great measure, to the invariable success, attending our numerous exploration expeditions during the last six years, and the complete collapse of every attempt that has been made to prevent our progress, or subvert our authority, during that time. Still, notwithstanding these very satisfactory results, I grieve to say that intestine feuds with all the horrors that accompany their progress are as rife now as ever they were, and it requires no great foresight to predict the possibility—I may even say the *probability*—of our sooner or later being compelled to take another stride in that inevitable march of progress, in that noble mission of peace, which seems to be our predestined lot wherever the Anglo-Saxon sets foot. Much, very much has already been done by our most just and patient Government, to induce these savages to amend their ways, to convert their “spears into ploughshares”, and to live in peace and harmony with all men. But it cannot of course be expected that the predatory habits, and head-taking customs of long generations of anarchy and bloodshed will be abandoned in a day, and we have hence got much earnest work before us, ere we can look forward to the completion of our task. The snake has been

scotched, not killed. And the further measures which it may yet be found necessary to take with regard to the management of the tribes inhabiting this frontier, form an anxious problem of the future into which it is needless my attempting to pry. We must simply watch the "signs of the times" and move with them, being content to know that a powerful Government is in the meanwhile ready to act as circumstances arise, and as the dictates of a true policy direct, confident that the wisdom with which so vast and heterogeneous a mass of nations has been governed elsewhere throughout the length and breadth of India, will also guide us safely through the shoals with which our administration is beset here, finally landing us in that safe haven, a well-governed peaceful country, to which we have every reason to look forward most hopefully.

CHAPTER II.

Government, Religion, and Manners.

From what I have stated, it will doubtless have already been gathered that the Angamis have no regular settled form of government. With them might is right, and this is the only form of law—or rather the absence of all law—heretofore recognised among them. Every man follows the dictates of his own will, a form of the purest democracy which it is very difficult indeed to conceive as existing even for a single day; and yet that it does exist here, is an undeniable fact. In every village we find a number of headmen or chiefs, termed *Peúmás*, who generally manage to arbitrate between litigants. The Nágas being a simple race, their quarrels are generally of a description easily settled, especially as owing to the fearful effects following a feud once started, they are chary of drawing first blood, and yet at times the most petty quarrel develops into a most serious feud. The actual authority exercised by these *Peúmás*, who are men noted for their personal prowess in war, skill in diplomacy, powers of oratory, or wealth in cattle and land, is, however, all but nominal, and thus their orders are obeyed so far only, as they may happen to be in accord with the wishes of the community at large, and even then, the minority will not hold themselves bound in any way by the wishes or acts of the majority. The Nágá *Peúma* is, in fact, simply *primus inter pares*, and often that only *pro tem*. The title, if such it may be called, is indeed really one of pure courtesy, and depends entirely upon the wealth, standing, and personal qualities of the individual himself. Theoretically, with the Angami, every man is his own master, and avenges his own quarrel. Blood once shed can never be expiated, except by the death of the murderer, or some of his near relatives, and although years may pass away, vengeance will assuredly be taken some

day. One marked peculiarity in their intestine feuds is, that we very seldom find the whole of one village at war with the whole of another village, but almost invariably clan is pitted against clan. Thus I have often seen a village split up into two hostile camps, one clan at deadly feud with another, whilst a third lives between them in a state of neutrality, and at perfect peace with both.

On the subject of religion and a future state, the Angámi appears to have no definite ideas. Some have told me that they believe that if they have (according to *their* lights be it remembered) led good and worthy lives upon this earth, and abstained from all coarse food, and especially have abstained from eating flesh, after death their spirits would fly away into the realms above, and there become stars, but that otherwise their bodies would have to pass through seven stages of spirit-life, and eventually become transformed into bees; others again, on my questioning them, have replied with a puzzled and surprised air, as if they had never given the matter a thought before, that "after death we are buried in the earth and our bodies rot there, and there is an end; who knows more?" Still from the fact that they invariably bury the deceased's best clothes, his spear and *dáo*, together with much grain, liquor, and a fowl, with the body, I think we may safely infer, that they certainly have some vague idea of a life hereafter, the thought of which, however, does not trouble them much. It is at quitting the actual pleasure of living, which he has experienced, that a Náǵá shudders, and not the problematical torments to be met in a hell hereafter, of which he knows nothing. And as to religion, such as it is, it may be put down as simply the result of that great characteristic, common to all savages, "fear". All his religious rites and ceremonies, his prayers, incantations, and sacrifices, are due to a trembling belief that he can thus avert some impending evil. But he is utterly unable to appreciate our feeling of awe, reverence, and affection towards an Omnipotent God. I have known a Chief, on the occasion of the death of his favourite son from an attack of fever contracted whilst out shooting Gúral* in the neighbourhood of his village, don his full war-costume, rush out to the spot, and there commence yelling out his war-cry, hurling defiance at the deity who he supposed had struck down his son, bidding him come out and show himself, impiously cursing him for his cowardice in not disclosing himself. Intense superstition is of course only the natural corollary to this kind of belief in a god in every hill and valley, a devil in every grove and stream. Undertakings of any importance, such as the starting of a war-party, the commencing of a journey, the first sowing out, or gathering in, of the crops, &c., are never begun without the previous consultation of certain omens, by which they pretend to be able to foretell, whether a successful termination

* A species of wild goat.

may be anticipated or not. Among the most common forms of consulting the oracle, one is that of cutting slices off a piece of stick and watching which side of these bits turn uppermost as they fall to the ground; another is, to lay hold of a fowl by the neck and throttle it, and if it dies with its right leg slightly crossed over its left, it is pronounced favourable to the accomplishment of the undertaking whatever it may happen to be. I have known of a large war-party turning back immediately, because a deer crossed their path,—a most unlucky omen. A tiger calling out in the jungles in front is a very lucky sign, whilst if heard in rear, it is just the contrary. In like manner there are several birds whose song if issuing from the left hand side is lucky, but if from the right the reverse.

They have several very curious ways of taking an oath. One of the commonest, as it is one of the most sacred, is for the two parties to lay hold of a dog or fowl, one by its head, the other by its tail, or feet, whilst the poor beast or bird is severed in two with one stroke of a *dáo*, emblematic of the perjurer's fate. Another is to lay hold of the barrel of a gun, or spear-head, or tooth of a tiger and solemnly declare, "If I do not faithfully perform this my promise, may I fall by this weapon" or animal, as the case may be; whilst a third, and one generally voluntarily offered after defeat, is to snatch up a handful of grass and earth, and after placing it on the head, to shove it into the mouth, chewing it and pretending to eat it, one of the most disagreeable and literal renderings of the metaphorical term "eating dirt" I have ever witnessed. A fourth is, to stand in the centre of a circle of rope, or cane, and there repeat a certain formula, to the effect that, if they break their vow, which they then repeat, they pray the gods may cause them to rot away as the rope rots, &c.

One among their many strange customs is that of "*kénnié*", corrupted by the Asamese into "*génna*," a description of *tabú* singularly similar to that in vogue among the savages inhabiting the Pacific Islands. This *tabú* is declared upon every conceivable occasion, thus at the birth of a child, or on the death of any individual, the house is *tabúed*, generally for the space of five days, and no one is allowed to go in or out except the people of the house. Again, any accidental death, or fire in the village, puts the whole village under the ban. In like manner before commencing either to sow or to reap, an universal *tabú* has to be undergone, and is accompanied by propitiatory offerings to their several deities, and no man dare commence work before. If their crops have been suffering from the attacks of wild animals, a "*kénnié*" is the remedy,—in fact there is no end to the reasons on which a "*kénnié*" must or may be declared, and as it consists of a general holiday when no work is done, this Angami sabbath appears to be rather a popular institution.

If a man has the misfortune to kill another by accident, he is com-

pelled to abandon home and retire into voluntary banishment to some neighbouring village for the space of three years.

They have a singularly expressive manner of emphasising messages. For instance, I remember a challenge being conveyed by means of a piece of charred wood, a chilli, and a bullet, tied together. This declaration of war was handed on from village to village until it reached the village for which it was intended, where it was no sooner read, than it was at once despatched to me by a special messenger, who in turn brought with him a spear, a cloth, a fowl, and some eggs, the latter articles signifying their subordination and friendship to me at whose hands they now begged for protection. It is perhaps scarcely necessary for me to explain that the piece of burnt wood signified the nature of the punishment threatened (*i. e.* the village consigned to flames), the bullet descriptive of the kind of weapon with which the foe was coming armed, and the chilli the smarting, stinging, and generally painful nature of the punishment about to be inflicted. And only the other day a piece of wood, with a twisted bark collar at one end and a rope at the other, used for tying up dogs with on the line of march, was brought in to me with another prayer for protection. The explanation in this case is of course obvious, namely, that a dog's treatment was in store for the unfortunate recipients of this truculent message. Two sticks cross-wise, or a fresh cut bough, or a handful of grass across a path, declares it to be closed. But of such signs and emblems the number is legion, and I therefore need only remark that it is curious to observe how the "green bough" is here, too, as almost every where, an emblem of peace.

The Angamis invariably build their villages on the very summits of high tabular hills, or saddle-back spurs, running off from the main ranges, and owing to the almost constant state of war existing, most of them are very strongly fortified. Stiff stockades, deep ditches bristling with panjies, and massive stone walls, often loop-holed for musketry, are their usual defences. In war-time, the hill sides and approaches are escarped and thickly studded over with panjies. These panjies, I may here explain, are sharp-pointed bamboo skewers or stakes, varying from six inches to three and four feet in length, some of them as thin as a pencil, others as thick round as a good-sized cane, and although very insignificant things to look at, they give a nasty and most painful wound, often causing complete lameness in a few hours. Deep pit-falls and small holes covered over with a light layer of earth and leaves, concealing the panjies within, are also skilfully placed along the paths by which an enemy is expected to approach, and a tumble into one of the former is not a thing to be despised, as I have had good reason to know. The approaches to the villages are often up through tortuous, narrow, covered ways, or lanes, with high banks on either side,

lined with an overhanging tangled mass of prickly creepers and brushwood, sometimes through a steep ravine and along the bed of an old torrent, in either case admitting of the passage of only one man at a time. These paths lead up to gates, or rather door-ways, closed by strong, thick and heavy wooden doors, hewn out of one piece of solid wood. The doors are fastened from the inside and admit of being easily barricaded, and thus rendered impregnable against all attack. These doors again are often overlooked and protected by raised look-outs, on which, whenever the clan is at feud, a careful watch is kept up night and day; not unfrequently the only approach to one of these outer gates is up a notched pole from fifteen to twenty feet high. The several clans, of which there are from two to eight in every village, are frequently divided off by deep lanes and stone walls, and whenever an attack is imminent, the several roads leading up to the village are studded over with stout pegs, driven deep into the ground, which very effectually prevents anything like a rush. On the higher ranges, the roads connecting the several villages, as well as the paths leading down to their cultivation are made with considerable skill, the more precipitous hills being turned with easy gradients, instead of the road being taken up one side of the hill and down the other as is usually the case among hill-men.

Their houses are built with a ground-floor, the slopes of the hills being dug down to a rough level, no mat covers the bare ground. They are generally placed in irregular lines, facing inwards, and are constructed after a pattern I have never seen anywhere except in these hills. These houses have high gable ends whose eaves almost touch the ground on either side, this I believe to be a precaution against high winds. The gable in front, which, in the case of men of wealth or position, is often decorated with broad, handsome weather boards, is from 15 to 30 feet high, and the roof slopes off in rear, as well as towards the sides, the gable at the back being only about from 10 to 15 feet in height. In width the houses vary from about 20 to 40 feet, and in length from about 30 to 60 feet. In many of the villages each house is surrounded by a stone wall, marking off the "compound" so to say, wherein the cattle are tethered for the night. Half the space under the front gable, is often walled in with boards as a loose stall, and bamboo baskets are tied up under the eaves of the house to give shelter to their poultry. Pig-styes also, in the corner of a compound, are not uncommon. The house itself is divided off into from two to three compartments according to the wealth or taste of its owner. In the front room, the grain is stored away in huge baskets made of bamboo from 5 to 10 feet high and about 5 feet in diameter. In the inner room, there is a large open fire-place, and around it are placed thick, broad planks, for sitting and sleeping upon, and the back room of all generally

contains the liquor tub, the most important piece of furniture in the house in the Nágá's estimation. In this they brew their "dzú", a kind of fermented beer, made of rice and other ingredients, composed of herbs found wild in the jungle. This liquor is the Angami Nágá's greatest solace, for strange to say never indulging in either opium, or tobacco (as many of his neighbours do), he may be seen sipping this "dzú", either through a reed (after the manner of a sherry cobbler), or with a wooden or bamboo spoon out of bamboo or mithan horn drinking cups, from morn to night.

Close to their villages, on either side of the road, as well as within, sometimes not a couple of yards from their houses, they bury their dead, raising over them large mounds, square, round, and oblong in shape, the sides being built up with large stones; sometimes an upright stone, or an effigy cleverly carved in wood, is added. In the latter case this grotesque caricature of the "human form divine" lying below, is decked out in a complete suit of all the clothes and ornaments worn by the deceased including a set of imitation weapons, the originals being always deposited in the grave with the body. In one instance I remember coming across a grave by the road side several miles away from any village, and on enquiry, learning, that it had been purposely placed there, exactly half way between the village in which the deceased had been born, and that in which he had died, and had passed the latter portion of his life. This was done, I was told, so as to enable his spirit to revisit either.

Huge monoliths, or large upright stones, which have been the subject of so much remark elsewhere, and which are to be met with all over the world, exist here too, and are not only to be found as remains of the past, but their erection may be witnessed almost any day at the present time. These monuments are erected, either singly, or in rows, and are meant to perpetuate the memory, sometimes of the dead, when they are in fact nothing more nor less than simply tombstones, sometimes of the living, in which case we may look upon them much in the light of statues. Thus I remember being considerably astonished some three years ago when the villagers of Sakháboma were pleased to raise such a monument to my humble self, a great compliment which was repeated last year by another village east of the Sijjo. These stones, which are often very large, and have sometimes to be brought from long distances, are dragged up in a kind of sledge, formed out of a forked tree on which the stone is levered, and then carefully lashed with canes and creepers, and to this the men, sometimes to the number of several hundreds, attach themselves in a long line and by means of putting rollers underneath they pull it along, until it has been brought up to the spot where it has been previously decided finally to erect it. Here a small hole is then dug to receive the lower end of the stone, and the sledge being tilted up on end, the lashings are cut adrift, and the

stone slides into position ; some leaves are then placed on the top and some liquor poured over it. This done, a general feast follows, and the ceremony is complete.

The average Angámi is a fine, hardy, athletic fellow, brave and war-like, and, among themselves, as a rule, most truthful and honest. On the other hand, he is blood-thirsty, treacherous, and revengeful to an almost incredible degree. This, however, can scarcely be wondered at when we recall what I have already related regarding revenge being considered a most holy act, which they have been taught from childhood ever to revere as one of their most sacred duties. The "blood-feud" of the Nágá is what the "vendetta" of the Corsican was, a thing to be handed down from generation to generation, an everlasting and most baneful heir-loom, involving in its relentless course the brutal murders of helpless old men and women, innocent young girls and children, until, as often happens, mere petty family quarrels, generally about land or water, being taken up by their respective clansmen, break out into bitter civil wars which devastate whole villages. This is no "word-painting" on my part, for I am here speaking of actual facts and a most deplorable state of affairs which seems to have existed from time immemorial, and is to be seen in full force up to the present day, a terrible check not only to the increase of population, but also a fatal barrier to all moral progress. I must confess it is not a little disheartening to think how long and how arduously we have striven, and yet how little we have done towards improving, civilizing, and weaning from their accursed thirst for blood, this otherwise noble race. But it is simply the old, old story, precept and example, the only means we have heretofore employed, worthy tools though they be, are perfectly powerless before the traditions of untold ages of anarchy and warfare. Thus we even find Nágás, who have acted for years as Dobháshas (Interpreters) at Samagúting, others as Policemen in Naugáon, some as Sepoys in Dibrúgarh, and not a few who have been educated under the parental care of kind missionaries, and have spent several years in the plains, where they have been taught to read and write, and have doubtless had very carefully inculcated into them the lessons of virtue and peace taught by our Christian religion, returning to their native hills not, as we should at first suppose, to render us any assistance in our good work here of endeavouring to secure peace, but rather on the contrary to indulge again and take part in all the scenes of rapine and cruelty going on around them, until at last it is difficult to say whether their evidently superficial, skin-deep education has not rather tended to enable them to out-Herod Herod in their wily plots of deep-laid treachery, or as they would call it "skilful strategy" ; scratch the Dobhásha and you will find the Nágá.

In height, the Angámi as a rule is somewhat taller than the average

of hill races, and is generally well proportioned, especially as regards his legs, the large muscles of the thigh and calf being remarkably well developed. His complexion is comparatively fair, though among them, as among almost all the Indo-Chinese races, we meet with various shades of brown, from the almost ruddy and light olive to the red-Indian and dark brown types. I do not, however, ever remember seeing a black Nágá, I mean a black such as is common in Bengal, except in one instance, and then further enquiry elicited the fact that he was not a pure Nágá at all, but the son of an Asamese captive who became naturalized, and was afterwards allowed to take unto himself a daughter of the land (of his involuntary adoption). In feature also there is great variety, but high cheek bones predominate. The men of the upper ranges are really often almost handsome, and some of the women might almost be called pretty. But as regards the latter, hard work and exposure, coupled with the trials of early maternity, soon tell a tale, and I have been quite surprised and grieved to see how soon they age. In little more than six years I have seen mere children develope into comely lasses, and these latter again into sturdy matrons, whilst I have watched wives and mothers, whose youthful looks at first surprised me, change suddenly into wrinkled old women with scarcely a trace of their former good looks about them. I confess, however, that beauty of form is not the rule in these hills. Whether it is that the more or less lavish display of such charms as they possess, enables us the better to exercise a discriminating judgment upon the beauty, or want of beauty, their forms display, I cannot pretend to say, but this much I do know, that here we may seek, and seek in vain, for any of the soft contours and lovely outlines which give shape to the persons of the women of other races. At the same time I must add that I have not failed to notice that *hill women* all over India, from the fair dwellers in Kashmir to their dark sisters inhabiting the uplands of Bengal, all fall off in this particular, and are very rarely indeed, if ever, able to boast of a good figure.

As with the men, so with the women, I think they are certainly taller than the average of other hill-women, and their features more regular. They are chaste, faithful, merry, and—unlike their brothers—never to be seen idle. Their duty it is to fetch the wood, draw the water, cook the food, and brew the liquor, besides working in the fields and weaving cloths at home. It will be observed that among the characteristics of the women I have placed chastity, and it may be as well perhaps for me to explain that by this term I do not for a moment mean to say that they are exactly chaste according to our ideas, but simply that they are true to and act up to, their own principles with regard to that virtue. The relationship between the sexes, and the exact footing on which it should stand, is, and ever has been, one of the world's most difficult problems, and the most

civilized and advanced among nations (whether ancient or modern, Christian or heathen) have found how difficult is the task of sailing between the Scylla of a Puritanical strictness which would keep the sexes almost wholly apart, and the Charybdis of a laxity to which it is difficult to put bounds. Here we have got a primitive state of society which, although it would not for a moment recognize, or even allow to exist, that plague euphemistically termed a "social evil", and although it punishes any serious breach of the marriage contract with death itself, yet never dreams of conceiving it possible that perfect continence on the part of the unmarried (or free portion of society) is to be either demanded or even desired. It may be asked, What are the consequences? I reply—Prostitution is a thing unknown here, and all the foul diseases that follow in its train, are evils to which Nágá flesh has not been born an heir. Here no Nágá Lais plies her shameful trade. A Nágá woman would scorn to barter for her person. And woe betide the mercenary lover who seeks to gain his end by other ways than those of love. Young men and maidens mix together with almost all the freedom allowed by nature's law. Incontinence on the part of the married however is rare, and an unfaithful wife is a thing almost unheard of, but then the penalty is *death*. Marriage and divorce are among the simplest of their rites, and sad to say, often follow each other within the year without comment or surprise. "Incompatibility of temper" is here quite sufficient for either the man or woman to demand a divorce, and to take it. Although strictly monogamous, both sexes can marry and remarry as often as they please. Such offspring as require the maternal aid follow the mother, and are tended and cared for by her until able to look after themselves, when they return to the father. Men may not only marry their deceased wives' sisters, but they may likewise marry their brothers' widows. On the other hand, it is altogether forbidden for cousins to intermarry. Parents may advise, but never attempt positively to control, the choice of their sons and daughters. Marriage is usually solemnized by a large feast, and the bridegroom, when he can afford it, makes a present to the bride's parents. Divorce necessitates a division of all property held in common, such as grain, household furniture, &c., and all property derived since the two became man and wife. In any division thus made, the late wife or divorcée gets one-third, whilst the man takes the remainder, and the woman then either returns to her own parents, or lives apart in a separate house until she marries again.

On the death of the father all property, excepting the house, is divided equally among all the sons alone, the youngest always receiving the house in addition to his share of the whole. Neither the widow nor daughters have any claim to aught except their clothes and ornaments, but they are generally supported by the sons until death or marriage.

The only national, offensive weapons, used by the Angami, are the spear

and *dáo*, but of late years they have managed to become the proud possessors of a considerable quantity of fire-arms, to obtain which is just now one of the keenest desires they have; in fact, an Angámi will give almost anything he has for a gun, and if he cannot get it by fair means, will run almost any risk to get it by foul. In several cases of gun thefts, some of which have been accompanied by murder, they have certainly proved themselves wonderfully bold and dexterous. The spear is generally a very handsome one, and at close quarters, or when thrown from an ambuscade, is a formidable weapon, well calculated to inflict a most dangerous wound. At anything over thirty yards, however, it is but of little use, and is not very difficult to dodge even at two-thirds of that distance. The spear-head is of iron, varying from 18 inches to 2 feet in length, and from 2 to 3 inches in breadth. Its shaft is generally from 4 to 5 feet in length, and is usually very picturesquely ornamented with scarlet goat's hair, here and there intermingled with a peculiar pattern of black and white hair; sometimes, though rarely, the whole shaft is beautifully worked over with scarlet and yellow cane, and it is always tipped at the bottom with an iron spike of from three inches to over a foot in length, used for sticking it into the ground. A Nágá would never dream of leaving his spear against a wall. It must be always kept in a perpendicular position, either by being stuck upright into the ground or by being suspended against one of the walls of the house, so as to keep it perfectly straight. On the war-path every Angámi carries two of these spears. The *dáo* is a broad-headed kind of hand-bill, with a heavy blade about 18 inches in length and only edged on one side. This *dáo* is invariably worn at the back of the waist in a rough sort of half scabbard made of wood. The only article of defence they possess is a large shield from 5 to 6 feet high, 2 feet broad at the top and tapering down to about a foot in breadth at the bottom. This shield is made of bamboo-matting, and is covered with either the skin of some wild animal (elephant, tiger, leopard, and bear being among the most common), or a piece of cloth, generally scarlet. In the latter case, or even without the cloth, it is decorated with pieces of skin cut so as to represent human heads, and tufts of scarlet goat's hair, whilst on the inside is attached a board, so as to make it spear-proof. From each corner of the upper end of the shield spring two cane horns from $2\frac{1}{2}$ to 3 feet in length, decorated with the long flowing tresses of human hair taken in war—probably the locks of some unfortunate woman butchered at the water hole—intermingled with goat's hair dyed scarlet; and from the centre rises a plume about 3 feet long of scarlet goat's hair, tipped at the top for about 4 inches in depth with white goat's hair, and along the top edge runs a fringe of white, downy feathers. Along the inner edge, a string of lappets, made of feathers of various

hues, white, black, blue, and scarlet, wave to and fro most gracefully, at every motion of the shield. Besides the spear, *dáo*, and shield, I must not omit to mention that, when proceeding out on a forray, they invariably take with them several bundles of "panjies", with which they rapidly cover the path on retreat, so as to disable and retard any party that may start in pursuit.

The only implements of husbandry they use, are the *dáo* described above; an axe common to almost all the tribes on this frontier, notable for its small size; and a light hoe, especially remarkable for its extraordinarily crooked handle, which necessitates a very bent position, in order to use it. The handle of this hoe is only about from 18 inches to 2 feet in length, and the iron tip from 6 inches to a foot in length. With these very simple articles they do all their tillage, both in their terrace cultivation and in their 'jhúms'. The soil of the terraced lands is extremely good; and from being kept well manured and irrigated, by means of artificial channels, along which the water is often brought from very long distances by means of aqueducts, ingeniously constructed of hollowed out trees, and sometimes bridging deep ravines, it yields a very large return. The rice for the terrace cultivation is generally sown in March, transplanted in June, and reaped in October. The rice in the *jhúms*—a system which, it is perhaps needless for me to explain, entails fresh land being taken up every three or four years—is generally sown broad cast in April and harvested in August. Besides rice, of which there are several sorts, the Nágás grow a kind of coarse *dál* or field-pea, Indian-corn, and several varieties of small grains, such as that which the Asamese call "*koni-dhán*", not to mention various kinds of yams, chillies, ginger, garlic, pumkins, and other vegetables, as well as cotton, which latter, however, is restricted to the lower ranges and low valleys.

With regard to domestic animals, the Angámi breeds cows (of a far superior kind to those met with in Asám), pigs, goats, dogs, and fowls, both for the purpose of food as well as for sale and barter. Roast dog is considered a great delicacy, and is supposed to be a particularly good diet for certain diseases. As may be easily understood, they are not nice feeders, and I believe there is really scarcely any single thing that walks, crawls, flies, or swims, that comes amiss to their voracious stomachs, and I have often been astounded to see the filthy carrion they can devour, not only with impunity, but with evident relish. And yet strange to say, good fresh milk is entirely repugnant to them, and they pretend that its very smell is enough to make them sick.

Finally, as regards the dress of the Angámi, I do not think that we can easily find a more picturesque costume anywhere than that of the men, but it requires to be seen to be understood, and I am afraid no amount of description can adequately represent the vivid colours, and general get-

up of a well-dressed Angami warrior, flashing about in all his gala war-paint, as he goes bounding along, making the hills re-echo again and again with his peculiar cry, which when taken up by several hundred voices has a most extraordinarily thrilling effect, sometimes going off into deep bass-tones that would do credit to any organ accompaniment, at others running into strangely fiendish, jackal-like yells.

The Angami's chief article of attire, and one which distinguishes him from most other Nágas, is a kilt of dark blue or black cotton cloth of home manufacture, varying from $3\frac{1}{2}$ to $4\frac{1}{2}$ feet in length, according to the size of the man, and about 18 inches in width, decorated with three, and sometimes, though very rarely, with four, horizontal rows of small white cowrie-shells. This kilt passes round the hips and overlaps in front, the edge of the upper flap is ornamented with a narrow fringe, whilst the under-flap having a string attached to its lower corner is pulled up tightly between the legs, and the string, which generally has a small cowrie attached to the end of it, is then either allowed to hang loosely a few inches below the waist belt, or is tucked in at the side, and thus the most perfect decency is maintained, forming a pleasing contrast to some of their neighbours "who walk the tangled jungle in mankind's primeval pride". I do not think that any dress that I have ever seen, tends so much to show off to the very best advantage all the points of a really fine man, or so ruthlessly to expose all the weak points of a more weedy specimen as this simple cowrie-begirt kilt. Thrown over the shoulders are generally, loosely worn, from two to three cotton or bark, home-spun cloths, according to the state of the weather. Some of these cloths are of an extremely pretty pattern, as for instance the very common one of a dark blue ground, with a double border of broad scarlet and yellow stripes on two sides, and fringed at both ends. When out on the war-trail, or got up for a dance, these cloths are worn crossed over the breast and back, and tied in a knot at the shoulder.

I may here note that, like our own Scotch Highlanders, every Nágá tribe uses a peculiar pattern of cloth, and thus any individual can at once be easily identified by his tartan.

The Angamis cut their hair short in front, and either brush it off the forehead, leaving it parted in the middle, or let it hang down straight, coming to about an inch above the eyebrow, after the manner of Cromwell's Round Heads. The hair on the top and back of the head is left long, and is tied into a peculiar knot, very like the chignons worn by our ladies in England a few years ago. Round this knot rolls of snow white cotton are bound, and on high-days and holidays into the base of this top knot they insert plumes of feathers according to the taste of the wearer. The favourite feather assumed by the warrior is the tail feather—white with a

single broad bar of black at the top—of one of the numerous kinds of Toucans, or Horn Bills, that inhabit the dense forests of the Barráil mountains. So much are these tail feathers sought after on this account, that a single feather will fetch as much as from 4 to 8 annas. Some again wear a wreath or coronet of bear's hair round the head, whilst others frizzle out their own natural hair à *l'Impératrice*. In their ears they wear several kinds of ornaments, but among the handsomest is the one formed of a boar's tusk behind the lobe of the ear fixing on, and forming the sheath to, the stem of a peculiar button-like rosette worn in front of the ear. This rosette is about an inch and a half in diameter; in the centre are two emerald green beetle's wings (from the *Buprestis sternicornis*), round which are a circle of long shiny, white seeds, and on the outside of this again an encircling fringe of scarlet hair, whilst from the lower portion flows down a long scarlet streamer of goat's hair. The tusk is generally ornamented round the base with very pretty red and yellow cane-work. Another extremely becoming ear ornament is made from the blue feathers of the jay. Brass earrings are also very common; but the most curious ear ornaments of all perhaps are the huge bunches of white cotton, sometimes as big as a man's fist, which some of the Nágás wear, giving a most queer monkey-like look to an otherwise not bad looking countenance. Strings of various coloured beads made of stone, shell, and glass, decorate their throats, the blood-red cornelian of a long hexagonal shape, and a peculiar yellow stone being among the most valued. Behind and on the nape of the neck is invariably worn the white conch shell, cut and shaped so as to fit properly, and suspended by a thick collar of dark blue cotton threads. A few also wear a queer barbaric-looking collar or scarf—for I have seen it worn both ways,—made of long locks of human hair intermingled with tufts of scarlet goat's hair and dotted all round with cowrie shells, from the bottom of which is suspended an oblong piece of wood, about 6 inches in length and about 4 inches in breadth, covered with alternate rows either of cowries, or the long, shiny, white seeds already referred to as used in the ear ornament, and black and red hair, and having a broad fringe of scarlet hair all round it.

Each arm is decorated either with a broad ring of ivory, being simply a slice about 2 inches wide cut off an elephant's tusk, or with very pretty looking bracelets about 3 inches wide, made of yellow and red cane, which are sometimes embellished with cowries and hair. All these armlets are invariably worn above the elbow.

On the legs just below the knee, they wear a number of bands of very finely cut cane dyed black, whilst a few wear leggings made of very fine red and yellow cane-work, extending from below the knee to above the ankle. These are usually worked on to the leg, and are left there until they wear out, which happens I am told in about three months.

It is strange to note how fond all nations, whether civilized or savage, are of bestowing some outward sign whereby all men may at once distinguish the man of deeds from the common herd, and thus we here find that the Angami equivalent for a V. C., or "reward of valour", is a Toucan's tail feather and hair collar, whilst the substitute for a medal, showing that the wearer has been in action, or at all events that he has formed part of an expedition, is cowrie shells on his kilt.

The dress of the women, though neat, decent, and picturesque in its way, is not nearly so showy as that of the men, and forms another noticeable instance of the female withdrawing from the contest wherever she finds the male a rival in the same field of indulgence in, and love of, personal decoration. The most important perhaps, though least seen, portion of a woman's dress is of course the petticoat, which is usually a piece of dark blue home-spun cotton cloth, about 2 feet in breadth, which passing round the hips overlaps about 6 inches. This is partially, if not entirely, covered by the folds of the next most important article of clothing, a broad cotton cloth, whose opposite corners are taken up and made to cross over the back and chest, thus covering the bosoms, and are tied in a knot over the shoulders. Finally, a second cloth is worn, either thrown loosely over the shoulders, or wrapped round the hips and tucked in at the waist. In the cold weather, they generally add an extra cloth, whilst in the warm weather, or when employed in any kind of hard work, such as tilling their fields, &c., they generally dispense with both these, and drop the corners of the other, or in other words simply strip to the waist.

Round their throats they love to load themselves with a mass of necklaces of all kinds, glass, cornelian, shell, seeds, and stone. In their ears the young girls wear a peculiar pendant formed of a circular bit of white shell, whilst the matrons generally dispense with earrings altogether. On their wrists above their elbows they wear thick heavy bracelets, or armlets, of brass, and a metal that looks like pewter. The young girls until they marry shave their heads completely, a very queer, ugly custom for which I have never succeeded in getting any adequate reason, nor can I suggest one. The married women braid or loop up their hair very much after the manner of the Irish peasantry, often adding a few foreign locks to make up for any deficiency. Brides are generally to be recognized at a glance, from their hair being allowed to fall in waving masses round the head, not being long enough to be tied up.

The accompanying admirable illustrations by Lieut. R. G. Woodthorpe, R. E., my able colleague and invaluable companion in the two last exploration expeditions into the Nágá Hills, will I trust enable my readers fully

to appreciate the leading features of some of the most interesting races that inhabit this frontier.

Plate XIX represents an Angámi Nága of Chédémá in his war-dress, with loins girt up, and carrying two spears, ready for action.

Plate XX is an Angámi woman from Khonomá.

Plate XXI, Fig. 1 is a young unmarried lass from Jotsomá, weaving in front of her father's house.

Fig. 2 is the sledge used by the Angámis for dragging up heavy monumental stones.

Fig. 3 is the sketch of a well-to-do Angámi Nága's house in Rezámi.

Fig. 4 are two heads (man and woman) of individuals from Themijumá (Eastern Angámis).

Fig. 5 is the sketch of an effigy over an Angámi warrior's grave at Kohima.

Fig. 6 represents the Eastern Angámi dáo.

Fig. 7 is the white shell ornament for the nape of the neck.

Fig. 8 is the Angámi ear ornament, mentioned above.

Plate XXII is the likeness of Soibang, the Chief of Bormúton (or Chopnú).

Plate XXIII is the likeness of Phemi, the wife of the Chief shown in the previous illustration.

Plate XXIV is a Hattigoriá Nága, and

Plate XXV is Assiringia, a woman of the same race.

I may here observe that several figures have been here introduced merely for purposes of comparison and illustrate Tribes to which my notes here do not refer to at all; I hope, however, should this paper prove of any interest, that hereafter I may be enabled gradually to furnish notes on these races also.

CHAPTER III.

Geology and Natural History.

As regards the geology and physical aspect of the country occupied by the Angámis and their neighbours, I cannot do better than quote from a report from the talented pen of my friend Major Godwin-Austen who states as follows :

" The dead level portion of the Dhansiri valley comes to an end a few miles to the west of Dimápúr, and at a very short distance towards Samagúting. The surface gradually rises over the broad conglomerate deposits, swept down out of the gorges of mountain streams like the Diphú-páni. The first line of hills rise abruptly to 2000 feet with a strike with the strata north-east and south-west, dipping south-east towards the main range at about 30° on the crest, the dip increasing rapidly northwards until nearly perpendicular at the very base, probably marking a great uninclinal bend in the rocks. These consist of sandstones, very thickly bedded in the upper portion, of red and ochre colour, interstratified with thinner beds of an indurated light coloured clay, nodules of which are very numerous and conspicuous in some of the soft sandstones. In exposed sections, such as that near the new tank at Samagúting, the strata are seen to be closely faulted in direction of the strike, the up-throw never exceeding a few feet. These beds I should refer to the Siwálik series. No mammalian remains have as yet been found in the neighbourhood. Nowhere is a better and more comprehensive view obtained of the broad alluvial valley of the Dhansiri and its great forest than from Samagúting. Mile beyond mile of this dark forest stretches away and is lost in the distant haze. During the cold weather this is, usually in the early morning, covered with a dense woolly fog, which about 10 o'clock begins to roll up from the Brahmaputra against the northern slope of the Barráil, and often hangs over Samagúting and all the outer belt of hills late into the afternoon, when the increasing cold dissipates it. The sandstone ridge, on which Samagúting is situated, runs parallel with the Barráil at a distance of 15 to 16 miles, measured from crest to crest. The Barráil rises very suddenly on its northern face, and the intervening country for a breadth of 8 miles is very low, forming a miniature *dhun*. This intermediate depression continues westward for many miles : the outer range marked by the hills of Phegi and Laikek. It terminates to the eastward on the Kadiúbá spur, thrown off from the high north-east extremity of the Barráil, and this spur coincides with the great east up-throw of the Sub-Himálayan rocks composing the highest part of that range, and this I believe is a great north-north-west—south-south-east dislocation in the mountain mass, marked by the course and gorge of the Zúbjá. This dislocation is, I think, also intimately connected with the change in direc-

tion of the main axis of elevation, which has thrown the line of main watershed away to the south-east from its normal south-west—north-east direction, which it assumes at Asálú. The dip of these tertiary rocks of the Barráil is steadily to the south-eastward throughout the whole distance, but it gradually changes round to due west, the beds on the highest part, Japvo, turning up at an angle of 35° west. These higher beds are fine slightly micaceous, ochre grey sandstones, very massive and weathering pinkish grey. From this the elevated out-crop of these sandstones tends to south, and is continuous south of the Barak in that direction right away into Manipur, conforming with the change in the strike of all the ridges, the parallelism of which is such a conspicuous feature of the physical geography. To the north-north-west the great change in this mountain system is marked by the broad re-entering arm of the Dhansiri, and the sudden appearance of the granitic series in force in the Mikir and Rengmá Nágá Hills, seen in the bed of the Nambor, and which becomes the principal feature eastward as far as the Gáro Hills. Extensive and thick-bedded deposits of clay and conglomerate are seen in the Samagúting *dhum*, forming broad plateau-capped spurs. I had no time to examine these closely. They appeared to be nearly horizontal, and may belong to the highest beds of the Siwálik formation or the remains of deposits formed prior to the cutting through of the Diphú-pání gorge. Analogous deposits to the last occur in the North-West and Panjáb Himálaya. At the base of the Barráil, proceeding to the depression at the sources of the Zullo and Sijjo, the Sub-Himálayan rocks pass downwards into thin-bedded sandy shales, with a steady westerly underlie. Whether the lowest beds represent nummulitic or even cretaceous rocks, it is impossible to say. The thickness is very great, at least 3000 feet; they rest on an older series of rocks with a totally different lithological aspect. There is unconformability not always apparent, for they partake of a general westerly dip. The strong bedded younger rocks are but little disturbed, and on the east of the Sijjo come in again at Telligo, nearly horizontal, with a slight dip to east on the main ridge towards Kopamedza, marking an anticlinal axis; their horizon is however lower. The older beds on the contrary are much crushed, and change their dip and strike very frequently, the result of prior disturbance. They are composed of clay slates and very dark blue, friable shales, alternating with others of pale ochrey tint. They are saliferous, and veins of milky quartz are occasionally seen. Several salt springs occur near the bottom of the Zullo valley, under Viswemah, where the Nágás evaporate the water to obtain it. A warm mineral spring also occurs here. Evidence of past glacial action is very marked on the north-east side of the Barráil, where its elevation is close under 10,000 feet. Small moraines project beyond the gorges of the lateral valley. These moraines originally consisted

of much earthy matter due to the soft sandstones out of which they are derived. This and long surface weathering has led to their being well cultivated and terraced, but the original lines of larger angular blocks are still apparent. Through these moraines the present streams have cut their channels down to the solid rock, leaving the slopes at an angle of 45° , out of which project great masses of the subangular sandstones. The thickness of the moraine at Kigwémá is quite 300 feet at the terminal slope, and the length of the former glacier would have been four miles to the crest of range at Japvo. At the head of the Zullo, traces of this former state of things are shown by the even height at which large transported blocks of the tertiary sandstones lie up against the sides of the ravine, resting on patches of rubble. No part of the Barráil is more beautiful than that between Kigwémá and Sopvoma, looking up the lateral glacial gorges, with their frowning steep sides running up to the crest of the Barráil, which is for the greater part a wall of grey rock and precipice. Dense forest covers the slopes, but from their steepness many parts are bare, breaking the monotony of this dark coloured mountain scenery. Where the steep rise in the slope commences, the spurs are at once more level and are terraced for rice cultivation. Not a square yard of available land has been left, and the system of irrigation canals is well laid out. I have never, even in the better cultivated parts of the Himálayas, seen terrace cultivation carried to such perfection, and it gives a peculiarly civilized appearance to the country."

The Botany of the Nágá Hills has still to be described, but this is a speciality only to be undertaken by an expert, to which title, I regret, I am unable to lay any claim whatever. I must therefore content myself with observing that oak, fir, birch, larch, apple, and apricot, are all to be found here, besides numerous other trees common to Asám. Of orchids there is a very great variety indeed. Indigenous tea is found growing all along the low northern slopes at the foot of the Barráil. Among the jungle products I may mention bees-wax, India-rubber, tea seed, and several fibres, besides red, yellow, blue, and black dyes.

As with the Botany, so with the Natural History, we require men who have devoted their lives to its study, to do the subject justice. I will therefore not attempt to do more than furnish the following list of some of the chief among the wild animals that I am personally aware are all to be found in the tract in question.

1. Elephant—*Elephas Indicus*. These animals swarm throughout the Dhansiri valley, and are found all along the low ranges of the Barráil, but are rare in the high Angámi country.
2. Rhinoceros—*Rhinoceros Indicus*. } These two animals are rare,
3. Wild Buffalo—*Bubalus Arni*. } and are only to be met with in the Dhansiri valley.

4. Mithan—*Gavæus frontalis*. These affect the forest-clad shades of the lower hills.
 5. Tiger—*Felis Tigris*.
 6. Leopard—*Pardus*. The black and clouded species of Leopard are also occasionally met with.
 7. Hill Black Bear—*Ursus tibetanus*.
 8. Indian Black Bear—*Ursus labiatus*.
 9. Badger—*Arctonyx collaris*.
 10. Wild Boar—*Sus Indicus*.
 11. Sambar Deer—*Rusa Aristotelis*.
 12. Barking Deer—*Cervulus Aureus*.
 13. Gooral—*Nemorhædus goral*.
 14. Civet Cat—*Viverra Zibetha*.
 15. Tiger Cat—*Felis Marmorata*.
 16. Common Wild Cat—*Felis Chaus*.
 17. Pangolin—*Manis pentadactyla*.
 18. Porcupine—*Hystrix leucura*.
 19. Hoolook—*Hylobates Hoolook*.
 20. Langur or Hanuman—*Presbytis Schistaceus*.
 21. Common Monkey—*Inuus Rhesus*.
 22. Otter—*Lutra vulgaris*.
 23. Bamboo Rat—*Rhizomys badius*.
 24. Common Brown Rat—*Mus decumanus*.
 25. Black Rat—*Mus Rattus*.
 26. Black Hill Squirrel—*Sciurus macruiroides*.
 27. Common Striped Squirrel—*Sciurus palmarum*.
 28. Gray Flying Squirrel—*Sciuropterus fimbriatus*.
 29. Brown Flying Squirrel—*Pteromys petaurista*.
- Among Game Birds I would mention the following :—
1. Peacock—*Pavo assamicus* (very rare and only in the plains).
 2. Deo Derrick Pheasant—*Polyplectron tibetanum*. Very numerous in the plains, valleys, and low hills, but only where there is dense forest.
 3. Derrick Pheasant—*Gallophasis Horsfieldii*.
 4. Argus Pheasant—*Cerionis Blythii* (very rare and only on the Bar-rail Mountains at high elevations).
 5. Jungle Fowl—*Gallus Bankiva* (?)
 6. Hill Partridge—*Arboricola rufogularis*.
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CHAPTER IV.

Language and Grammar.

It is perhaps needless for me to state that the Angámis have no written language whatever. I have hence adopted the Roman character, and the plan I have followed for designating the long sound of all vowels has been by placing an accent immediately over the vowel; thus á is to be invariably pronounced like the English long a, as pronounced in such words as "mast", "father", "ask", &c.; é like the English a in "fate", or e in "prey", "convey", &c.; í in like manner as the French i, or English ee, as in "peep", or i as it is pronounced in such words as "fatigue", "marine", &c.; ó as the o in notice; and finally ú similarly to the English long o in "move", "prove", &c., or oo as in "school", "tool", "fool", &c. This system, I may also add, is the one I have followed in the spelling of all proper names.

I may here premise that laying no claims to philological lore of any kind, but on the contrary aspiring only to the humble position of a worker in the field, whose duty it is to collect and construct the bricks alone, so to say, of that science, I shall not even hazard a guess as to what great family of languages the Angámi belongs, but prefer to leave that question for abler pens to decide. I may, however, say that in common with the tongues spoken by most, if not all, other nations in a similar state of civilization, or rather barbarism, the Angámi is slightly, though not altogether, monosyllabic and most simple in its structure, its root words undergoing very little change except for the purpose of symphony.

The gender of nouns is denoted by different words for the different sexes, as :

"Thépvomá" (often contracted into "themma" and "ma"), a man.

"Thenúma", a woman.

"Apó", father; "A'zo", mother.

"Nopvo", husband; "Kimá", wife.

Also by a change of termination, when the first syllable of the word is dropped; thus "mithú", a cow generally, whether male or female, "thúdo" a bull, "thúkr", a cow (female); "tékhú", a tiger generally, whether male or female, "khúpvo" a tiger (male), "khúkr" a tigress; and often by the addition of the abbreviated forms of the terms "poshi", male, or "pokr", female; thus "chúshi" a male elephant, "chú-kr" a female elephant. And sometimes by the addition of the terms "thépvomá", man, and "thenúma", woman; thus, "núno" a cat, whether male or female, becomes "núno thépvomá" a male cat, and "núno thenúma" a female cat.

The plural is obtained by simply adding the termination "ko" to the

singular; as "thépvomá" a man; "thépvomáko" men; "kéthé" a stick, "kéthéko" sticks. But when a numeral is used, the noun remains in the singular, as "thépvomá péngú" five men, "kéthé súrú" six sticks.

They have got a queer way of dropping the first syllable, or prefix, of certain substantives, apparently for sake of euphony, when employed in the body of a sentence; thus, for instance, a dog is "tefoh", but Whose dog is

that? is "Háo sópo foh gá"; and again, a spear is "réngú", but my spear is "ángú", where it will be observed that the "té" in the former, and the "ré" in the latter example, are entirely dispensed with.

Cases are not marked by inflection, nor by the addition of any affix, except in the ablative when the particle "ki", from, is affixed.

Adjectives appear to be invariably placed after the nouns they qualify, and have no change of termination for number, case, or gender; as "thépvomá kévi" a good man; "téfoh késho kénná" two bad dogs; "chú kézá" a great elephant.

The comparative degree is formed by the positive adjective being preceded by "ki", as "kezá" great, "ki kézá" greater; and the superlative by adding "shwé", "tho", or "péré", to the positive; as "kézá shwé", "kézá thó", or "kézá péré", extremely great or greatest.

The pronouns are as follows:

I	A.	This	Háú.
Thou	No.	These	Háúko.
He	Po.	That	Lu, or Chú.
We	Heko.	Those	Lúko.
Ye	Neko.	Who?	Sopo?
They	Luko.	Which?	Kiú?
		What?	Kézipo?

The adverbs are "ki?" where?, and "chénú" now.

The cardinal numbers are:

1	Po.	11	Kérr-o-pokr.	21	Mékú-pokr.
2	Kenná.	12	Kérr-o-kenná.	30	Ser.
3	Sé.	13	Kérr-o-sé.	40	Lhi-dá.
4	Dá.	14	Kérr-o-dá.	50	Lhi-péngú.
5	Péngú.	15	Kérr-o-péngú.	60	Lbi-súrú.
6	Súrú.	16	Kérr-o-súrú.	70	Lhi-thenna.
7	Thénná.	17	Mékú-pemo-thenna.	80	Lhi-thethá.
8	Théthá.	18	Mékú-pemo-thetha.	90	Lhi-thekú.
9	Thékú.	19	Mékú-pemo-thékú.	100	Kra.
10	Kérr.	20	Mékú.	1000	Nie.

The only ordinals in use are "kerao" first, "kenó" second, and "sesao" third.

The Verbs are simple, and appear to have but three tenses, the Past, Present, and Future, thus :

Chú—To give.

Present Tense.

I give	A' chúéwó.	We give	Heko chúéwe.
You give	No chúéwé.	Ye give	Neko chúéwe.
He gives	Po chúewe.	They give	Luko chúéwe.

Past Tense.

I gave	A chúé.	We gave	Heko chúé.
You gave	No chúé.	Ye gave	Neko chúé.
He gave	Po chúé.	They gave	Luko chúé.

Future Tense.

I will give	A chuto.	We will give	Heko chuto.
You will give	No chuto.	Ye will give	Neko chuto.
He will give	Po chuto.	They will give	Luko chuto.

Imperative.

Give—Chúché.

They have no names for the days of the week, and their year commences in March. The names of the several months are as follows :

January	Képhá.	July	Chá-chi.
February	Khrénié.	August	Chádi.
March	Kérrá.	September	Chéré.
April	Kéno.	October	Réiéh.
May	Kézi.	November	Théné.
June	Képsú.	December	Vi-phe.

The following phrases will perhaps best illustrate the structure of the language.

Phrases—English and Angami.

1. Open the door. Kikhá khreché.
2. Shut the door. Khikhá phá lé ché.
3. Don't forget. Si motáhéché.
4. Be silent. Kémé kri bá che.
5. Don't make a noise. Méléhe.
6. Make haste. Chimbá shé, or chí mbái lé.
7. Come quickly. Mhái vorché.
8. Go quickly. To mbái shi ché.
9. Come here. Háki phir, or Háki vor.
10. Sit there. Chiki bálé, or Lúki bálé.
11. Who is he? Lú sopo?

12. What is this? Háú kéjipo?
13. They are liars. Luko ketichema áwé.
14. Who lives there? Sopo chinú báia?
15. It is raining. Tir rié.
16. It will rain soon. Péchámo tir vor táté.
17. What do you want? No kéjipo cháia?
18. What do you say? No kéjipo púa?
19. Is that true? Sú ketho mé?
20. Who says so? Sopo sidi púa?
21. Don't you know? No simo mé?
22. What shall I eat? Á kéjipo chito?
23. Why do you laugh? No kidi núbá?
24. Don't cry. Krá hé.
25. Don't strike him. Po vā hé.
26. Call some coolies. Kúli máko kéléché.
27. It is very hot to-day. Thá ti lé shwé.
28. There is no wind. Tirékhrá moté.
29. Open your mouth. No méko shi.
30. Have you eaten your dinner? No mháché mé?
31. Ask him. Po ketso shi ché.
32. Tell him. Po ki pú shi ché.
33. What advantage is there in that? Lú nú kepo vi to-gá?
34. There is no use in that? Lu nú mhápori jilé injito.
35. What animal is this? Khúno háú kejiogá?
36. Whose house is that? Lú sopo kiro?
37. You can go now. No ché voléto.
38. My head aches. A tsú chi bá.
39. My stomach aches. A vá chi bá.
40. Where did you learn Assamese? No Téphi khwé kéji poki nú silégá?
41. Does your tooth ache? No hú chi bá mé?
42. What is the price of this? Háú po má kéji ki ro?
43. Where are you going? No kéjiki votogá?
44. Where shall you stay to-night? Chéji kéjiki po bátogá?
45. Which is the best of these three? Sé ko kejiú vigá?
46. Is anything eatable to be got there? Chi nú mhá kéchiho bá nhá?
47. Do you know where he is gone? No simé mogá po keji ki votogá?
48. Clean those things well. Lú koha shwé kémésává.
49. Is to-day a holiday with you? Thá kenié bá mé?
50. What is the name of this village? Háú rénná zá keji po ga?
51. Of what clan are you? No sopo thinorr?

52. Do you know him? No po si mé?
53. How is he to-day? Po thá kejimhá bágá?
54. He is better than he was yesterday. Ndú ki tha viwé.
55. Why does he not come? Po kidi vor mogá?
56. That is the same thing. So kémhá zo.
57. I cannot go to-morrow. A sodú tolélho.
58. Very well, go the day after to-morrow. Viwé, kénonhá volé.
59. He is a very bad man. Po thémmá kesho shwé.
60. He can speak Manipuri. Po Mákre má khwe si bawe.
61. He tells me one thing and you another. Po áki dé po pú, unki dé kékri pú.
62. Bring me some water. Dza hocho pévor ché.
63. Where is my coat? A búlá kéjé ki ji ro?
64. Bring my hat. A tsú re pe vorché.
65. Hold my horse. A kwir té chilé.
66. Clean my shoes. A phikwé sipevichiché.
67. Warm some water. Dza hocho péléshiché.
68. Don't make it very hot. Pélé bá váhé.
69. Give me some salt. Métsá hocho árchú ché.
70. This egg is rotten. Háú po dzá showe.
71. What milk is that? Háú kézipo dzú gá?
72. Have you caught any fish to-day? Tha kho té mé?
73. Yes, I have caught one large "Máhsir". Uwé, á Tháchá kézá po télé.
74. Have you got it with you there? Kio? unzé má bá mé?
75. Yes, I have it with me. Uwé a zé ma ba we.
76. Very well, cook it and I will eat it. Oh viwé, shálé á chito.
77. Get me some fruit, I am hungry. Rosi hocho pé vor, a mér báwe.
78. What fruit would you like to eat? Rosi ki kijipo chiniébágá?
79. Blow the fire. Mi mhé shé.
80. The fire is out. Mi mhé té.
81. It is time to go. To vo vi té.
82. Don't turn to the right. Uzatchá vo tá hé.
83. No, I will turn to the left. Mo, á úvi chá voto.
84. Stop here. Háki bálé.
85. Who is there? Chiki sopo thágá?
86. Buy me ten fowls. A thévã kerr khrléto.
87. They won't sell any fowls now. Uko chenú thévá mápori zwé moché.
88. Why won't they sell? Kidi zwé mo gá?
89. If you will give a rupee apiece, they will sell. No ráká po-po chusiche zwéto we.

90. Who is the Chief of your village? Nérámá somá Péúgá.
91. Viponiú is our Chief. Viponiú Péú má zo.
92. Is that bill-hook sharp? Lú zé pollā vi mé mo?
93. It is getting dark, light the candles. Tizitáiyé mi pétú shi.
94. Give him some liquor. Zúháro hochó pótehú che.
95. Awake me to-morrow at cock-crow. Sodú thévá kékhú ki á késú si ché.
96. Tell me what things I am to bring. Á ki pú si che kezi má ma se vorto.
97. You must bring rice, wood, and salt. Chiko, si, métsá, sé vorché.
98. All men must die. Pete thémmá satá che.
99. He lives alone. Po thé porebi ba.
100. I also have ten horses. A ri kwior kérr bá.
101. You are always coming late. No tisonha vor menoba.
102. Go and see. Vo di philé.
103. I did not say anything. Á mhá pori pú mo.
104. Where have you been? No kezi ki vogá?
105. Take this away. Háó sé tá.
106. That boat belongs to me. Lú á rú wé.
107. Blow the fire. Mi mhén shi-che.
108. The wind blows now. Tirekhra ió.
109. Shall he go by land or by boat? Késó nú chúto me rú nú chúto?
110. Can you swim? No dzā nú tolé si mé moro.
111. He can not come to-day. Lú thá vor lel ho.
112. Take this to your Chief. Háú se vo Péú má tsúché.

CHAPTER V.

Vocabulary.

<i>English.</i>	<i>Angami.</i>	<i>English.</i>	<i>Angami.</i>
A, an, or one, <i>a.</i>	Po	Acquaintance, <i>n.</i>	Késimā, Urchima
Abandon, <i>v.</i>	Kháshiché	Advance, <i>v.</i>	Ralé
(let go)		Advantage, <i>n.</i>	Mévi
Abdomen, <i>n.</i>	Váká, Vádi	Adversary, <i>n.</i>	Ngúmémá
Above, <i>prep.</i>	Mho	Adult, <i>n.</i>	Khisámá
Absent, <i>a.</i>	Tomo	Adze, <i>n.</i>	Kethi
Abundance, <i>n.</i>	Kia-pézé	Afar, <i>ad.</i>	Shachá
Accept, <i>v.</i>	Lélé	Affection, <i>n.</i>	Khré
Accompany, <i>v.</i>	Kézétollé	Affray, <i>n.</i>	Kevá
Accurate, <i>a.</i>	Potú	After, <i>prep.</i>	Sá
Ache, <i>n.</i>	Chi, Shi	Afternoon, <i>n.</i>	Thékhévé
Acid, <i>a.</i>	Kroh, Khié	Again, <i>ad.</i>	Lá

<i>English.</i>	<i>Angami.</i>	<i>English.</i>	<i>Angami.</i>
Aged, <i>a.</i>	Kétchá	Badger, <i>n.</i>	Chomhúvho
Ague, <i>n.</i>	Kipé	Bag, <i>n.</i>	Lôkho
Air, <i>n.</i>	Timelhú	Bald, <i>a.</i>	Súpá
Alike, <i>ad.</i>	Kémhá	Ball, <i>n.</i>	Kémérr
Alive, <i>a.</i>	Rhi	Bamboo, <i>n.</i>	Kérrá
All, <i>a.</i>	Pété	Bank <i>n.</i>	
Alligator, <i>n.</i>	Rá, Khokérrá	(of a river),	Khé
Almighty, <i>a.</i>	Pétékiké-méchiá-shwé	Banquet, <i>n.</i>	Lhé
		Bare, <i>a.</i>	Mésá
Alone, <i>a.</i>	Thé, Rébi	Bark <i>n.</i>	
Aloud, <i>ad.</i>	Rékré	(of a tree),	Pokú, Sikú
Also, <i>ad.</i>	Ri	Bark, <i>v.</i>	Ré
Altogether, <i>ad.</i>	Pété kézé	Barn, <i>n.</i>	Télha-ki
Always, <i>ad.</i>	Tí-sonhá	Barrel, <i>n.</i> (gun),	Pú, Missipú
Amid, <i>prep.</i>	Métcho-má	Barter, <i>v.</i>	Kélli
An, <i>a.</i> one.	Pó	Basin, <i>n.</i>	Mékhú
And, <i>conj.</i>	Rí	Bastard, <i>n.</i>	Tékhrono
Anger, <i>n.</i>	Nímo	Bat, <i>n.</i>	Sep-chá
Ankle, <i>n.</i>	Phímhi	Bathe, <i>v.</i>	Zúrélúhé
Annually, <i>ad.</i>	Tichí-keprá	Battle, <i>n.</i>	Térrh
Ant, <i>n.</i>	Mháché	Beak, <i>n.</i>	Tá
Ant-hill, <i>n.</i>	Repá	Beam, <i>n.</i>	Kipér, Kiprr
Apiece, <i>ad.</i>	Po-po	Bear, <i>n.</i>	Thégá
Armadillo, <i>n.</i>	Tépphé	Beard, <i>n.</i>	Támá
Armlet, <i>n.</i>	Kétho	Beat, <i>v.</i>	Vúché
Armpit, <i>n.</i>	Sochá	Beautiful, <i>a.</i>	Ngú-kévi
Around, <i>prep.</i>	Pété-ki	Bedstead, <i>n.</i>	Thézi
Arrow, <i>n.</i>	Thillsi	Bedding, <i>n.</i>	Zikhrá
Ascend, <i>v.</i>	Kulé, kholé	Bee, <i>n.</i>	Mékhwi
Ash, <i>n.</i>	Migé	Beef, <i>n.</i>	Mithúchi
Ask, <i>v.</i>	Kétcholé	Before, <i>prep.</i>	Mohtzú
Asleep, <i>ad.</i>	Zhitéwé	Beg, <i>v.</i>	Krohehiléché
Aunt, <i>n.</i>	Aná	Beggar, <i>n.</i>	Kroh-kechimá
Awake, <i>v.</i>	Chésélé	Behind, <i>prep.</i>	Sátchá
Axe, <i>n.</i>	Mérr, Sídúrr	Behold, <i>v.</i>	Pilé
Babe, Baby, <i>n.</i>	Nitchúnomá	Belch, <i>v.</i>	Pékhé
Bachelor, <i>n.</i>	Khisamá.	Bellow, <i>v.</i>	Moié
Back, <i>n.</i>	Nakú	Belly, <i>n.</i>	Vádi, Váká
Backdoor, <i>n.</i>	Kithokikhá	Belly-ache, <i>n.</i>	Vadiehé
Bacon, <i>n.</i>	Thévohchih	Below, <i>ad.</i>	Kho, Khro
Bad, <i>a.</i>	Késho	Belt, <i>n.</i>	Séshá

<i>English.</i>	<i>Angami.</i>	<i>English.</i>	<i>Angami.</i>
Bend, <i>v.</i>	Kéréguilé	Breadth, <i>n.</i>	Zá, Poza
Best, <i>a.</i>	Kévithou	Break, <i>v.</i>	Bétswélé
Better, <i>a.</i>	Sésá kévi	Breast, <i>n.</i>	Mérr
Between, <i>prep.</i>	Donú, Metchonú	Breath, <i>n.</i>	Há
Beware, <i>v.</i>	Chiswéléché	Breathe, <i>v.</i>	Ha shiché
Big, <i>a.</i>	Kézá	Bridge, <i>n.</i>	Peh
Bill-hook, <i>n.</i>	Jé	Bring, <i>v.</i>	Séphir, Pékhor
Bind, <i>v.</i>	Phalé	Broad, <i>a.</i>	Méjá
Bird, <i>n.</i>	Pérá	Broad-cloth, <i>n.</i>	Búlá, Khwé [wá
Birth, <i>n.</i>	Péno, Kepéno	Broken, <i>part.</i>	Váphroá, Bétswé-
Birth-place, <i>n.</i>	Képénophé	Broom, <i>n.</i>	Nizwéro
Bitch (female of dog), <i>n.</i>	Phúkr	Brother (elder), <i>n.</i>	Zoráo
Bite, <i>v.</i>	Méki	„ (younger), <i>n.</i>	Sázéo
Bitter, <i>a.</i>	Kékhú	Brother-in-law, <i>n.</i>	Ami
Black, <i>a.</i>	Kéti	Brow, <i>n.</i>	Tikhá
Blind, <i>a.</i>	Mhichié	Buck (deer), <i>n.</i>	Tékhia
Blood, <i>n.</i>	Thézá	Buffalo, <i>n.</i>	Rélli
Blossom, <i>n.</i>	Nipú	Build, <i>v.</i>	Siléché
Blow, <i>v.</i>	Mhélé	Bull, <i>n.</i>	Thúdo
Blue, <i>a.</i>	Loshi	Bullet, <i>n.</i>	Missi-shi
Board, <i>n.</i>	Mélá, Sobjá	Bundle, <i>n.</i>	Kérri
Boat, <i>n.</i>	Rú	Burden, <i>n.</i>	Pé, Pwé
Boatman, <i>n.</i>	Rú kéthumá	Burn, <i>v.</i>	Réwá, Pétúá
Body, <i>n.</i>	Moh	Burst, <i>v.</i>	Báphroá, Pro
Boil, <i>v.</i>	Kérédálé	Bury, <i>v.</i>	Khrúalé
Bold, <i>a.</i>	Kérézá	Butterfly, <i>n.</i>	Sopro
Bone, <i>n.</i>	Ru	Button, <i>n.</i>	Búllá-kékú
Book, <i>n.</i>	Léshi	Buy, <i>v.</i>	Khri-léche
Boot, <i>n.</i>	Phikú	By and by, <i>ad.</i>	Kéná
Borrow, <i>v.</i>	Thépulé	Bird cage, <i>n.</i>	Pérá khoro
Bottom, <i>n.</i>	Khro	Calf, <i>n.</i>	Mithúnó
Bough, <i>n.</i>	Si chié, sicho	Calf (of leg), <i>n.</i>	Phitsá
Boundary, <i>n.</i>	Therrá	Call, <i>v.</i>	Késhi-ché
Bow, <i>n.</i>	Thilla	Cane, <i>n.</i>	Therr
Bowels, <i>n.</i>	Porá	Canon, <i>n.</i>	Sidi (Misi kedi, i. e., great gun)
Box, <i>n.</i>	Kúzo	Cap, <i>n.</i>	Tsuré
Boy, <i>n.</i>	Nichumá	Carry, <i>v.</i>	Phléché
Bracelet, <i>n.</i>	Jiétsi	Cat, <i>n.</i>	Núnno
Brains, <i>n.</i>	Khrú	Catch, <i>v.</i>	Télé
Brass, <i>n.</i>	Méréni	Caterpillar, <i>n.</i>	Chopé

<i>English.</i>	<i>Angami.</i>	<i>English.</i>	<i>Angami.</i>
Centipede, <i>n.</i>	Zárr	Cubit, <i>n.</i>	Thú
Chaff, <i>n.</i>	Phá	Cup, <i>n.</i>	Téhi
Chain, <i>n.</i>	Théja, Kídú	Custom, <i>n.</i>	Uzié
Change, <i>v.</i>	Kélilé	Cut, <i>v.</i>	Dú siché
Charcoal, <i>n.</i>	Mijje	Daily, <i>ad.</i>	Tisonhá
Chase, <i>v.</i>	Hová	Dance, <i>v.</i>	Kéhúché
Cheap, <i>a.</i>	Méli	Dark, <i>a.</i>	Zi
Cheek, <i>n.</i>	Jwé, Jo	Daughter, <i>n.</i>	Nopvú
Chicken, <i>n.</i>	Thévno	Day, <i>n.</i>	Khinhi
Child, <i>n.</i>	Nichúmá	Dead, <i>a.</i>	Sátalé, Késsá
Chin, <i>n.</i>	Mékho	Deaf, <i>a.</i>	Poniorogúwé
Civet cat, <i>n.</i>	Thékrr	Dear (costly), <i>a.</i>	Répézé
Clap, <i>v.</i>	Bídá	Deer, <i>n.</i>	Tékhiá
Claw, <i>n.</i>	Phitchó	Descend, <i>v.</i>	Lákerlé
Clean, <i>a.</i>	Mésá	Devil, <i>n.</i>	Terho-kesho
Cleave, <i>v.</i>	Phrolé	Dialect, <i>n.</i>	Nekhwé
Cloth, <i>n.</i>	Khwé	Difficult, <i>a.</i>	Ré
Cloud, <i>n.</i>	Kémhú	Dig, <i>v.</i>	Théléché
Cobweb, <i>n.</i>	Séréchá	Dirty, <i>a.</i>	Kérhú
Cock, <i>n.</i>	Votzú	Disease, <i>n.</i>	Mháché
Cold, <i>n.</i>	Mékú, Si	Distant, <i>a.</i>	Shá-chá
Cold season, <i>n.</i>	Tisi	Ditch, <i>n.</i>	Zúrharr
Come, <i>v.</i>	Phirché, Vorché	Divide, <i>v.</i>	Kezácháshiche
Comprehend, <i>v.</i>	Siléché	Dog, <i>n.</i>	Téfoh
Conceal, <i>v.</i>	Kéváléché	Door, <i>n.</i>	Ki-khá
Cook, <i>v.</i>	Sháléché	Dove, <i>n.</i>	Mokbrú
Copper, <i>n.</i>	Paisáji	Drag, <i>v.</i>	Kivorché
Cord, <i>n.</i>	Kérré, Kéié	Drink, <i>v.</i>	Králéché
Cost, <i>n.</i>	Pomá	Drum, <i>n.</i>	Kébbá
Cotton, <i>n.</i>	Chopsa, Chotsa	Drunk, <i>a.</i>	Kémézé
Cover, <i>v.</i>	Whéshiché	Dry, <i>a.</i>	Késsá
Count, <i>v.</i>	Phréléché	Dry, <i>v.</i>	Phésiché
Cow, <i>n.</i>	Thúkr	Dung, <i>n.</i>	Bo
Cow-dung, <i>n.</i>	Mithúbó	Dysentery, <i>n.</i>	Thézúbo
Coward, <i>n.</i>	Kémithímá	Ear, <i>n.</i>	Nié
Cowree, <i>n.</i>	Késhá	Earring, <i>n.</i>	Rénni (for males) ; Niso (for fe- males)
Crab, <i>n.</i>	Ségo	Earth, <i>n.</i>	Kizi
Crazy, <i>a.</i>	Kéloho, Kéniamá	Earthquake, <i>n.</i>	Kiéki [Náthúchá
Crooked, <i>a.</i>	Kéregwi	East, <i>v.</i>	Náki-kéthúchá or
Crow, <i>n.</i>	Shijja		
Cry, <i>v.</i>	Králé, Roiyé		

<i>English.</i>	<i>Angami.</i>	<i>English.</i>	<i>Angami.</i>
Eat, <i>v.</i>	Chi	Five,	Péngú
Egg, <i>n.</i>	Dzo, Podzo	Flat, <i>a.</i>	Mézi
Eight,	Théthá	Flint, <i>a.</i>	Jipvorú, Kétsé-thégá
Eighteen,	Mékú-pomo-thé-thá	Flower, <i>n.</i>	Ménipú or Nhápú
Eighty,	Lhí-théthá	Fly, <i>v.</i>	Proché
Elbow, <i>n.</i>	Búthú	Fog, <i>n.</i>	Kémhú
Elephant, <i>n.</i>	Chú, Tsú	Foot, <i>n.</i>	Phi
Eleven,	Kerr-o-pokr	Forehead, <i>n.</i>	Tikhá
Evening, <i>n.</i>	Théva	Forest, <i>n.</i>	Nhá, Ketsá
Eye, <i>n.</i>	Mhi	Forgive, <i>v.</i>	Khásiché
Eyebrow, <i>n.</i>	Uké	Forget, <i>v.</i>	Rékra, Motáché
Eyelash, <i>n.</i>	Mhimá	Formerly, <i>ad.</i>	Kéráki
Eyelid, <i>n.</i>	Mhi-né	Fort, <i>n.</i>	Kúdá
Fall, <i>v.</i>	Krr	Fortify, <i>v.</i>	Kúdahúléché
False, <i>a.</i>	Kétichi, Kéchirr	Forty,	Lhídá
Far, <i>a.</i>	Shá-chá	Four,	Dá
Fat, <i>a.</i>	Lo	Fourteen,	Kérr-o-dá
Father, <i>n.</i>	Pú, or Apú	Fowl, <i>n.</i>	Thévá
Fault, <i>n.</i>	Gwákemo	Friend, <i>n.</i>	Áso
Feather, <i>n.</i>	Má, Thévmá	Frog, <i>n.</i>	Gwirrno
Feeble, <i>a.</i>	Kéméné	Front door, <i>n.</i>	Ki-khá
Feed, <i>v.</i>	Váchi	Fruit, <i>n.</i>	Shi, si, rosi
Female, <i>a.</i>	Pokrr	Gall-bladder, <i>n.</i>	Thésiéh
Fetch, <i>a.</i>	Péphirché	Ginger, <i>n.</i>	Kévú
Fever, <i>a.</i>	Rokí	Girl, <i>n.</i>	Reliénúmá
Few, <i>a.</i>	Petsa, Hotcho	Give, <i>v.</i>	Chúché
Fifteen,	Kérr-o-péngú	Go, <i>v.</i>	Totáché, Toshi
Fifty,	Lhí-péngú	Goat, <i>n.</i>	Ténio
Fight, <i>v.</i>	Kénné-ché, Térrh-siché	God, <i>n.</i>	Terrho-diú
Fill, <i>v.</i>	Sú-shiché	Gold, <i>n.</i>	Soná
Fin, <i>n.</i>	Khoshitsi	Good, <i>a.</i>	Kéví
Find, <i>v.</i>	Ngú-shiché	Goose, <i>n.</i>	Tophá-kedi
Finger, <i>n.</i>	Bichino	Grandfather, <i>n.</i>	Apúcháo
Fire, <i>n.</i>	Mí	Grandmother, <i>n.</i>	Áchapfú, or Azáp-vú
First, <i>a.</i>	Kéráo	Grandson, <i>n.</i>	Nono
Fish, <i>v.</i>	Khoté	Granddaughter, <i>n.</i>	Nokimá
Fish, <i>n.</i>	Kho	Grass, <i>n.</i>	Nhá
Fish-hook, <i>n.</i>	Khoshégwí	Grasshopper, <i>n.</i>	Tékú
Fishing-rod, <i>n.</i>	Khosési	Grave, <i>n.</i>	Mokhrú

<i>English.</i>	<i>Angami.</i>
Great, <i>a.</i>	Kédi, Kézá
Green (color), <i>a.</i>	Pézié or Képézié
Green (raw), <i>a.</i>	Kérhé
Ground, <i>n.</i>	Kézi
Gullet, <i>n.</i>	Mezáro
Gun, <i>n.</i>	Missi
Gunpowder, <i>n.</i>	Bákhár
Guts, <i>n.</i>	Rá
Hail, <i>n.</i>	Prr
Hair (of man), <i>n.</i>	Tsú-thá, Thá
Hair (of animal), <i>n.</i>	Má
Half, <i>a.</i>	Téchá
Halfway, <i>n.</i>	Chákhwipo
Hammer, <i>n.</i>	Jivátché
Hand, <i>n.</i>	Bi, or Bhi
Handsome, <i>n.</i>	Ngú-vi
Hawk, <i>n.</i>	Múvino
He, <i>pro.</i>	Po
Head, <i>n.</i>	Tsú
Hear, <i>v.</i>	Réniélé
Heart, <i>n.</i>	Mélú
Heavy, <i>a.</i>	Meswi
Heel, <i>n.</i>	Phitso
Hen, <i>n.</i>	Vokrr
Here, <i>ad.</i>	Háki
Hide, <i>v.</i>	Kéválé
Hill, <i>n.</i>	Kizikhrú
Hip, <i>n.</i>	Ligé
Hoe, <i>n.</i>	Kéjá
Hog, <i>n.</i>	Vokrr
Hold, <i>v.</i>	Téléché
Honey, <i>n.</i>	Mékhwitdza
Hoof, <i>n.</i>	Mú, Pomú
Horn, <i>n.</i>	Ká, Poká
Horse, <i>n.</i>	Kwirr
Hot, <i>a.</i>	Lé
House, <i>n.</i>	Ki
How? <i>ad.</i>	Kidi?
How much? <i>ad.</i>	Kéziki?
How many? <i>ad.</i>	Kichúró?

<i>English.</i>	<i>Angami.</i>
Hundred, <i>a.</i>	Krá
Hunger, <i>a.</i>	Mérr
I, <i>pro.</i>	A
Idiot, <i>n.</i>	Kélého
Idle, <i>a.</i>	Kétsomá
Iron, <i>n.</i>	Théjá
Ivory, <i>n.</i>	Chúhú
Jaw, <i>n.</i>	Méchie
Join, <i>v.</i>	Méthúshi
Jump, <i>v.</i>	Prúsihé
Jungle-fowl, <i>n.</i>	Voprr
Jungle, <i>n.</i>	Nhá
Keep, <i>v.</i>	Pévéléché
Kick, <i>v.</i>	Phitchá-potché
Kid, <i>n.</i>	Téniono
Kidney, <i>n.</i>	Mécha
Kill, <i>v.</i>	Dákhrléléché
Kilt, <i>n.</i>	Ni, Méni
Kind, <i>a.</i>	Mézié
King, <i>n.</i>	Kédimá
Knee, <i>n.</i>	Khútzá
Knot, <i>n.</i>	Pélé
Knuckle, <i>n.</i>	Bikhrr
Ladder, <i>n.</i>	Khéá
Lame, <i>a.</i>	Réhié
Language, <i>n.</i>	Khwé, Dé
Leaf, <i>n.</i>	Nié
Leather, <i>n.</i>	Chizá
Leg, <i>n.</i>	Phi
Lemon, <i>n.</i>	Shohosi
Length, <i>n.</i>	Kéchá
Leopard, <i>n.</i>	Tékhúkhúiha
Lick, <i>v.</i>	Méiéché
Lightning, <i>n.</i>	Timepri or Timellá
Lip, <i>n.</i>	Sho
Listen, <i>v.</i>	Réniéléché
Little, <i>a.</i>	Kéchi, Chi
Little finger, <i>n.</i>	Bichono-re-khró-cho
Liver, <i>n.</i>	Séh
Long, <i>a.</i>	Kechá

<i>English.</i>	<i>Angami.</i>	<i>English.</i>	<i>Angami.</i>
Lungs, <i>n.</i>	Phiéh	Now, <i>ad.</i>	Ché
Man, <i>n.</i>	Thépvomá, <i>or</i> Má Thémmá	Oil, <i>n.</i>	Gákridzú
Mangoe, <i>n.</i> (fruit)	Merrosi	Old, <i>a.</i>	Kétsá
Meat, <i>n.</i>	Themo	Once, <i>ad.</i>	Zopo
Medicine, <i>n.</i>	Dárú	One,	Po
Mend, <i>v.</i>	Threléché	Onion, <i>n.</i>	Khorá
Middle, <i>n.</i>	Métso	Orange, <i>n.</i>	Chiffo
Midnight, <i>n.</i>	Tilloki	Orphan, <i>n.</i>	Méronomá
Milk, <i>n.</i>	Núdzú	Owl, <i>n.</i>	Bokhro
Monkey, <i>n.</i>	Tékwi	Pain, <i>n.</i>	Chi
Month, <i>n.</i>	Khrr	Peacock, <i>n.</i>	Rádi
Moon, <i>n.</i>	Krr, <i>or</i> Khrr	Pig, <i>n.</i>	Thevo (wild pig, Mengi)
Mosquito, <i>n.</i>	Virú	Pigeon, <i>n.</i>	Topér
Mother, <i>n.</i>	Ázo	Plantain, <i>n.</i> (tree.)	Tékwhési
Mountain, <i>n.</i>	Kiji-khrú, <i>or</i> Sájé- khrú	Poison, <i>n.</i>	Théri
Mound, <i>n.</i>	Répú	Poor, <i>n.</i>	Mháji
Mouse, <i>n.</i>	Zúcheno	Porcupine, <i>n.</i>	Sékrú
Moustaches, <i>n.</i>	Támá	Potato, <i>n.</i>	Réphé
Mouth, <i>n.</i>	Tá	Pull, <i>v.</i>	Teshilé
Mud, <i>n.</i>	Niébé	Push, <i>v.</i>	Neshi
Musket, <i>n.</i>	Missi	Raft, <i>n.</i>	Gwéiá
Nail (finger), <i>n.</i>	Bitsé	Rafter, <i>n.</i>	Terhú
Naked, <i>a.</i>	Métho	Rain, <i>n.</i>	Tir
Navel, <i>n.</i>	Loh	Rat, <i>n.</i>	Thézú
Near, <i>prep.</i>	Képénoki	Raw, <i>a.</i>	Kérhi
Neck, <i>n.</i>	Vo	Red, <i>a.</i>	Kéméri, Loiá
Needle, <i>n.</i>	Thépré	Rest, <i>v.</i>	Rélité
Nephew, <i>n.</i>	No, <i>or</i> Sázéono	Return, <i>v.</i>	Lákérlé
Nest (bird), <i>n.</i>	Pérrá-khrú	Rhinoceros, <i>n.</i>	Kwédá
Net, <i>n.</i>	Zú	Rib, <i>n.</i>	Tié
New, <i>a.</i>	Késsá	Rice (unhusk- ed), <i>n.</i>	Lhámá
Niece, <i>n.</i>	No	Rice (husked and cooked), <i>n.</i>	Té
Night, <i>n.</i>	Tizi	Rice (uncook- ed), <i>n.</i>	Chiko
Nine,	Thékú	Rich, <i>n.</i>	Máhni
Nineteen,	Mékú-pemo-thékú	Ring, <i>n.</i>	Bikhá
Ninety,	Lhi-thékú	Ripe, <i>a.</i>	Mé
No, <i>ad.</i>	Mo		
Nose, <i>n.</i>	Nhitchá		

<i>English.</i>	<i>Angami.</i>	<i>English.</i>	<i>Angami.</i>
River, <i>n.</i>	Kerr	Sly, <i>a.</i>	Méié
Road, <i>n.</i>	Cha, Shá	Small, <i>a.</i>	Chi, Kéchi
Root, <i>n.</i>	Mi, Pomi	Smell, <i>v.</i>	Thengúsiché
Rope, <i>n.</i>	Kérré, Kéié	Snake, <i>n.</i>	Tinhi
Rotten, <i>a.</i>	Titá	So, <i>ad.</i>	Hidi.
Rupee, <i>n.</i>	Ráká	Son, <i>n.</i>	No, Ano
Salt, <i>n.</i>	Métsá	Sour, <i>a.</i>	Khié
Same, <i>a.</i>	Kémhá	Sow, <i>v.</i>	Vokrr
Sand, <i>n.</i>	Hochá	Span, <i>n.</i>	Kúpo
Sap, <i>n.</i>	Sidzú	Spear, <i>n.</i>	Réngú
Save, <i>v.</i>	Pévélé	Spider, <i>n.</i>	Siré
Say, <i>v.</i>	Pulé	Spit, <i>v.</i>	Métsáchiché
Scratch, <i>v.</i>	Pekhwásiché	Spleen, <i>n.</i>	Nútú
See, <i>v.</i>	Pwhisiché	Square, <i>a.</i>	Pokádá
Seize, <i>v.</i>	Téléché	Stab, <i>v.</i>	Phiésiché
Seven,	Théná	Star, <i>n.</i>	Thémú
Seventy,	Lhi-théna	Steal, <i>v.</i>	Réguléché
Seventeen,	Mékú-pémo-théná	Stick, <i>n.</i>	Kéthé
Shade, <i>n.</i>	Tisú	Stone, <i>n.</i>	Kétché
Shallow, <i>a.</i>	Kélloki	Stomach, <i>n.</i>	Vádi, Váká
Shame, <i>a.</i>	Méngá	Straight, <i>a.</i>	Mézi
Share, <i>v.</i>	Kézáléché	Stream, <i>n.</i>	Kérr
Sharpen, <i>v.</i>	Kérsiché	Strength, <i>n.</i>	Kéméti
Shave, <i>v.</i>	Thásiché	Strike, <i>v.</i>	Vúsiché
Shield, <i>n.</i>	Pézhi	Suck, <i>v.</i>	Kélbéléché
Short, <i>a.</i>	Kétzá, Kéchi	Sun, <i>n.</i>	Náki
Shoulder, <i>n.</i>	Búkhé	Swear, <i>v.</i>	Réswéléché
Shut, <i>v.</i>	Kévásiché	Sweep, <i>v.</i>	Tswéáché
Sick, <i>a.</i>	Mbáchi	Sweet, <i>a.</i>	Kémú
Silver, <i>n.</i>	Rákájé	Tail, <i>n.</i>	Mi
Sing, <i>v.</i>	Kéllisichiché	Take, <i>v.</i>	Léléché
Sister, <i>n.</i>	Alápvo	Tall, <i>a.</i>	Rékré
Sister-in-law, <i>n.</i>	Mé, Amé	Tear, <i>v.</i>	Kihásiché
Sit, <i>v.</i>	Bálé	Ten, <i>a.</i>	Kérr
Six,	Súrá	Testicle, <i>n.</i>	Dza
Sixteen,	Kérr-o-súrá	They, <i>pro.</i>	Lúko
Sixty,	Lhi-súrá	That, <i>a.</i>	Lú
Skin, <i>n.</i>	Jih	Then, <i>ad.</i>	Nhi
Sky, <i>n.</i>	Ti	There, <i>ad.</i>	Chinú, Lúki
Sleep, <i>v.</i>	Jiléché	Thick, <i>a.</i>	Mélloh, Shi
Slowly, <i>ad.</i>	Rekrihé-rekrihé	Thief, <i>n.</i>	Kérégúamá

<i>English.</i>	<i>Angami.</i>	<i>English.</i>	<i>Angami.</i>
Thin, <i>a.</i>	Repvo.	Warm, <i>v.</i>	Péléléché
This, <i>pro.</i>	Háo, chú	Wash, <i>v.</i>	Ménisiché
Thirty,	Sérr	Water, <i>n.</i>	Dza
Thirst, <i>n.</i>	Térrh	Wax, <i>n.</i>	Mekhwibo
Thorn, <i>n.</i>	Chohú	We, <i>pro.</i>	Héko
Thou, <i>pro.</i>	No	West, <i>n.</i>	Náki-keleta, Náki- átchá
Thousand,	Nié		
Three,	Sé	Wet, <i>v.</i>	Pétséléché
Throw, <i>v.</i>	Péiésiché	What, <i>pro.</i>	Kézi
Thunder, <i>n.</i>	Prthé	When, <i>ad.</i>	Kéziki
Thus, <i>ad.</i>	Hidi	Where, <i>ad.</i>	Kinú, Kirá
Tie, <i>v.</i>	Pháléché	Which, <i>pro.</i>	Kiú, Kéziú
Tiger, <i>n.</i>	Tékhú-khúdi	White, <i>a.</i>	Kekiá, Kepe <i>or</i> Kéchá
To-day, <i>ad.</i>	Thá		
Toe, <i>n.</i>	Bhichino	White-ant, <i>n.</i>	Mékhr
To-morrow, <i>ad.</i>	Sodú	Who, <i>pro.</i>	Sorú, Soporú
Tongue, <i>n.</i>	Méllá	Why, <i>ad.</i>	Kéziú
Tooth, <i>n.</i>	Hú	Wide, <i>a.</i>	Zá, Méiá
Torch, <i>n.</i>	Mitú	Widow, <i>n.</i>	Sáthémipvomá
Touch, <i>v.</i>	Bésiché	Widower, <i>n.</i>	Thémi, Sámimá
Tree, <i>n.</i>	Si	Wife, <i>n.</i>	Kimá
Tribe, <i>n.</i>	Thino	Wind, <i>n.</i>	Tikhrá
Truth, <i>n.</i>	Kétho	Wind-pipe, <i>n.</i>	Mézaro
Twelve,	Kérr-o-kéná	With, <i>prep.</i>	Zé
Twenty,	Mékú	Within, <i>prep.</i>	Nú
Two,	Kéná	Woman, <i>n.</i>	Thénúma
Unbind, <i>v.</i>	Phishiché	Wood, <i>n.</i>	Si
Uncle (father's side), <i>n.</i>	Ne, Ané	Wrist, <i>n.</i>	Búché
Uncle (mother's side), <i>n.</i>	Amúi	Write, <i>v.</i>	Léshi-ruléché
Unite, <i>v.</i>	Kéméthúsiché	Yam, <i>n.</i>	Pdzá
Unripe, <i>a.</i>	Mémo	Ye, <i>pro.</i>	Néko
Vegetable, <i>n.</i>	Gá	Year, <i>n.</i>	Chi, Titchi
Village, <i>n.</i>	Réná	Yellow, <i>a.</i>	Loihé
Warm, <i>a.</i>	Lé	Yes, <i>ad.</i>	U, Uwé
		Yesterday, <i>n.</i>	Ndú
		You, <i>pro.</i>	No

An Account of the Maiwár Bhils.—By T. H. HENDLEY, Surgeon, Jaipúr Agency, Rájputáná.

(With a plate.)

Much has been written on the subject of the Bhils, but it may not be thought uninteresting to give an account of those members of the race who reside in the hilly tracts of Maiwár, as there they have perhaps best preserved their individuality. I have been able to collect a good deal of information, whilst residing amongst them as Surgeon of the Maiwár Bhil Corps, and have in addition derived much benefit from the local knowledge of Thákur Gambhír Singh, a Ráthor Chief settled in the Tracts. Major Gunning, Commandant of the Bhil Corps, has kindly read the bulk of my paper, and has also furnished a large number of valuable notes, without which it would have been difficult to complete the subject—to both these gentlemen my best thanks are due.

Religion.—In the present day, the religion of the Bhil is one of ignorance and fear, modified more or less by contact with powerful and formed faiths; in some parts of Khándesh, for example, Muhammadanism has been the prevailing influence, in Maiwár Brahmanism. In the hilly tracts, the erection of cairns, usually on hill tops; the adoption of Shiva and his consort as symbols of the powers of terror and darkness; the construction of stone platforms on which stand blocks, smeared with red paint; the sacrifice of animals and tradition of human oblations; the use of effigies of the horse, are apparently relics of their ancient faith.

Cairns.—Piles of loose stones, solid or hollowed out in the centre, or mere platforms, are erected on the summits of high hills, the supposed *stháns* or seats of the gods or goddesses, usually the latter—in or on these are arranged a large number of stone or burnt clay images of the horse. I have seen a hollow cairn on the verge of a steep crag near Khairwára, four feet in diameter and as many deep, filled with these images, each of which was about four inches in length. On the platforms the effigies are ranged in rows, often with many broken *chirághs* (clay dishes) in front of them; in these ghí or oil had been burnt, and the stones and horses were blackened with grease. Above wave on long bamboos pieces of rag, a universal custom amongst Hindus, Muhammadans, and even Christians (Roman Catholics), who often leave a shred of clothing on a pole or neighbouring bush as tribute to the guardian or deity of the shrine. It will be noted hereafter that some of these cairns or platforms are erected to the memory of the dead, but this is, perhaps, due to the supposition that the spirits of the deceased go to the hill deities.

The common explanation of the construction of cairns and horses is as follows :—Heaven is supposed to be but a short distance from earth, but the souls of the dead have to reach it by a very painful and weary journey, which can be avoided to some extent during life by ascending high hills, and there depositing images of the horse—which, in addition to reminding the gods of the work already accomplished, shall serve as chargers upon which the soul may ride a stage to bliss. The more modest make a hollow clay effigy, with an opening in the rear, into which the spirit can creep. An active Bhíl may, in this fashion, materially shorten the journey after death : both men and women follow the custom.

Sir, J. Malcolm says, "They (the Bhíls) reverence the horse and do "not mount him ; all their legends" (as far as Major Gunning and I can discover, the people of the Tracts appear to have no legends) "hinge upon him, "they make mud horses which they range round the idol" ; this they do in the fort at Khairwára "and promise to mount him, if he will hear their prayer". This superstitious adoration, which is quite universal amongst them, and which exists in parts of the Tracts where a living horse is almost unknown, might, perhaps, seem to favour a Turanian connexion, and be a relic of a life in which the horse was of some use to them, as it is now with the races who live on and by his swiftness (Túra, swiftness as of the horse). The custom is a common one. In a paper on 'Nooks and Corners in Bengal' (Journal, Asiatic Society of Bengal, Vol. XXI), the author notices that the villagers offer clay horses at the foot of a tree near Plassey ; these people were probably Muhammadans, as Ja'far Sharíf in his *Kánún-i-Islám* mentions this as a custom amongst them. A Bhíl explanation for the ascent of hills is the desire to obtain offspring. The Rájpút adores the horse, as he does his sword, his elephant, and furniture of war, at the Dasahrá, Installation of Chiefs, &c., but much in the same sense as the Káyath his writing materials, the fencer his sticks, or the baniá his account-books ; to him, therefore, we cannot look for the origin of the Bhíl custom.

Platforms of stone, or *stháns*, on which are placed slabs upright, generally plain, or merely named after a god and daubed with red paint, sometimes carved to represent Hanumán, quite an aboriginal deity if not the deified aborigine himself. The deity to whom the slabs are dedicated is usually Mahádeva ; occasionally a regular Devárgan, or court of gods, is formed around the real object of worship, but this is accidental. I have neither seen nor heard of any gigantic stone monuments existing in the Bhíl country, either Menhirs or Cromlechs, as found in the Dakhin, nor should we expect to find them where pre-eminently a village system flourishes, as amongst the Bhíls : such works require a powerful and united people for their construction. The erection of a slab is perhaps as good an evidence of the existence of this Turanian custom as the presence of a huge and in-

destructible monument. The favourite deities are Mahádeva, Rúdra, the god of terror who is to be appeased with blood, and his even more awful consort Párvatí, Deví, Mátá. Malcolm says—"They reverence chiefly Mahádev, and Sítala Mátá, also Phúlbaí Mátá, in cholera and epidemic sickness—Kálíbaí Badribáí, and Gúnábáí, small-pox." In the tracts the first of all goddesses is Samúda Mátá; her *sthán* is near the village of Dhelána, about eight miles north of Khairwára. Mahádeva and Hanumán are worshipped in every village. Local deities are numerous, and are named after the hill or neighbouring village; the most-famed in the Khairwára district are* Kániála-báppí, one of the largest páls, or villages, in the tracts, and Vájar Mátá,† at Jáwará, where are the famous silver and lead mines. The Bhíl women worship this, their Juno Lucina, for offspring; the temple is in the valley; and in the outer hall, by favour of the priest, British officers often spend the hot part of the day, when on the march. The Bhíl sipáhis salám to the image within the cell, but say it is of little use doing so, as the power of the goddess has failed since British influence became supreme; as proof they mention the desertion of the mines. Most Bhíls think the strong English Gods too much for the weak deities of their country, hence their desire to embrace Brahmanism, which comes within the scope of their understanding, raising them in the social scale, and, where there are Bráhma native officers, giving them, in their opinion, a better chance of promotion. This feeling the Bráhmans are not slow to take advantage of, and it requires great vigilance to defeat them. Such a readiness of adaptation would no doubt, as in the case of the Santáls, render them eager listeners to Christian Missionaries, but their circumstances require that the teaching should be of the simplest form, directed to them as a whole tribe rather than to individuals. Their main object is social advancement, and this they may well think would be most easily secured by reverencing the strong English Gods; their character would lead, however, to the conclusion that interest alone would not long remain the ruling motive.

Other local deities are—

Ambáo Mátá, at Limbarwára on the Gújarát border.

Thúr Mátá, at Thúr.

Bhar Mátá, at Amajrá.

Karah Mátá, at Dankiwára.

Pipláhín Mátá, on the Thúr Hill.

Bholiyá Dewat, at Bílak.

Dor Mátá, at Dailáná.

Here might be noted that the tombs of fakírs, bairágís, &c., are respected. These individuals, called Bhábhá, meet with some attention in life.

* Named after the hill on which it stands.

† Near Ríri village in the Dúngarpur state.

One near Khairwára is noted for his possession of the virtue of perpetual chastity, which he preserves under constant temptation !

Sacrifices.—Long before the British power was felt in Maiwár, the Bhíls sacrificed human beings. I have not been able to discover whether the victims were captives, or trained for the purpose, as amongst the Khonds, but am informed that the priests encouraged the people, and gave them every opportunity of seeing the sacrifice. Goats are now offered to Mátá or Deví, and the oblation is devoured by the worshipper. The tradition of human sacrifice exists amongst the Mínás; a goat is still offered daily at the shrine of Ambadeví, at Amber, the ancient capital of Dhúndár, or Jaipur, as a substitute for the human victim formerly stated to have been sacrificed at the same place.

At installations at Jodhpur, buffaloes and goats are sacrificed in front of the four-armed Deví and thrown down the rock face of the fort, so again at the very ancient temple of Deví on the Chitor Hill. These are probably relics of aboriginal worship, rather than imitations of the offerings to Kálf or Dúrgá, for they have existed from time immemorial, against the general feeling of the Rájpút who is more a Vaishnavi than a Shivaít, although there are not wanting indications that the last named sect are attaining the pre-eminence. The Sirohí Mínás are much addicted to sacrifice; the Bhíl delights in blood, and no one enjoys the Dasahrá slaughter more than he, although his greed for the flesh is no doubt a great inducement to slaying the animal.

Priests.—These are termed “Waties” or “Jogís”, and belong to the Jogí caste, with whom the Bhíls eat and drink. Bráhmans and Bairágís are revered, but as a Ráo of Bánsawára once said, “They beat them too”. A case in point was noted at Khairwára; a fakír near that station was attacked by Bhíls, his tongue torn out and face mutilated, merely because he concealed a rupee in his mouth, and the thieves were determined to have it, and disliked his hypocrisy.

Ideas of Heaven.—The Bhíl has a very dim idea of a future state. He believes the soul goes before his gods, and that the spirits of the dead haunt places they lived in during life. He also holds that there is a limited transmigration of souls, especially in spirits becoming evil ones. Eclipses and the motions of the heavenly bodies are deemed to be the play of their gods, and they howl with the Hindu when the moon is eclipsed. Unlike the Khonds and other wild races, they do not consider that a man-eating tiger has within him the spirit of a victim, who assists him in his raids; this superstition I found common on the slopes of Mount Abú amongst the Hindu religious men, especially at the shrine of the Muni Vasishtha, the reputed originator of the hill. I was told by one of the Bráhmans that the soul of a departed brother had entered the body of a tiger, but up to the time of my visit had

contented himself with disturbing by his howls the devotions of the holy brethren.

A writer in J. A. S. B., Vol. VIII., of 1839, notices the accumulation of mud horses about Ábú, which he says are thought to be placed at spots of victory. There seems to be no trace of serpent worship amongst them.

Festivals.—The Bhíls keep up the Holí and the Dasahrá, as they are then afforded opportunities of drinking to excess, and so indulging themselves, that at these seasons they appear more like beasts than men. Although it is stated that the Holí has always been observed amongst them, it does not appear that its origin is other than pure Hindu, as the mode of celebration does not differ from that in vogue elsewhere. It is kept up ten days, *gulál* (red powder) is thrown about, dances take place, rude jests are made, and the women attack and insult travellers until they release themselves by paying a small fine. The Bhágar Bhíls (J. A. S. B., Vol. IX., 1840) are said to keep up the Holí fire throughout the year.

There are two feasts in the year, though not at fixed times, although the cultivators hold one at the ingathering of harvest.

Fairs are attended in the Tracts, and afford opportunities for feasting. All Bhíls worship at Rakabnáth, seven miles from Khairwára, a shrine which is said to have been discovered by one of their people 900 years ago.

Superstitions.—Foremost amongst these is the belief in witches (*dá-kran*) and the power of the witch-finders (*bhopás*) to detect them.

Any one who is willing and has a grievance, sickness, or otherwise, has only to bribe a witch-finder sufficiently to obtain a victim, generally the wife or relative of an enemy, who is at once swung, head downwards, on a tree, where she is tortured by applications of red pepper to her eyes, nostrils, &c. Not twenty years ago, during the rains, a woman was swung in this way in the presence of British officers, who were unable to rescue her, as an impassable river lay between them. Should the unlucky woman escape death, she is turned out of the village, or, perhaps, the *bhopá* finds out under the influence of another *douceur*, that he was mistaken. The crime was a very common one, and even now cases are often reported, and where detection follows, the witch-finders are severely punished.

At the confluence of the Són river with the Myhí, four miles from Khairwára, I met a grey-haired man, who complained that he was turned out of the páls by the inhabitants, who said that his presence ruined their crops; he had been tried for murder, but acquitted for want of evidence, the people, however, thought that the curse of Heaven was upon him.

Bhíls are firm believers in omens; for example, a person sneezing, or a cat passing him, would make a man return home without accomplishing the work he had set out to do. A lizard also is looked upon as a harbinger of good or evil under certain conditions. They believe in Bhúts and Churails

(male and female departed spirits), &c. They wear charms or amulets on their right forearm and (women especially) on the head, to keep away the spirits. These charms are generally pieces of blue string with seven knots on them, each knot being tied on whilst the witch-finder recites some incantation; the knots are covered with metal to keep them undefiled. They are bound on during the Holí, Dasahrá, or other festivals.

Career of a Bhi'l from birth to death. *Birth.*—The woman is aided by her female friends, and should there be a *sage femme* amongst the people of other castes, she may be consulted in difficult cases, otherwise their trust is in Deví, who is probably as valuable as the midwives, who usually shut up the woman in a warm hut, and even in cases of hæmorrhage, apply warm cloths, and administer hot-spiced drinks. Cross births, as amongst most uncultivated people, are rare, and if they occur, are either left to the goddess, or presenting parts are hooked or amputated in accordance with the advice of the most knowing person, male or female, in the district—in this, however, there is little distinction between Hindu and Bhi'l. The mother remains impure twenty days, an intermenstrual period. Guns are fired at the birth of a boy, and friends are feasted. The child is named by either a Bráhmaṇ or a Waiti, after some astrological jugglery. Examples of names will be given hereafter. The child is suckled two or three years. Twin births are not thought to be common.

The fact of the general adoption of polygamy would appear to indicate a natural preponderance of female births, and at the same time prove the absence of the crime of infanticide. This may be further demonstrated by the observation that “old maids of 40 to 45 years of age are constantly seen about Khairwára carrying wood, &c”. The children are wrapped in clothes after birth and placed in round cradles of bamboo. The father teaches the boy to hunt, fish, &c., and he is said to be a man in his twelfth year, hunting on his own account in his fifteenth.

Marriage.—There is no fixed time for marriage: any time after the girl's tenth year, when she first dresses with some decency, will do. When the time has arrived, the father sets out in search of a bride for his son. She must not be a cousin, nor one of his own clan, although of course of the tribe. When the girl is found, she is placed on a stool, under which six pais are thrown, the boy's father now puts one rupee and twelve pais in her hand, with a quantity of rice, which the girl before rising throws behind her back—thus is the betrothal completed. The bridegroom always pays *dápa* (money) for his bride to her guardian,—a clear case of purchase.

On an appointed day (at puberty), the marriage takes place, a priest usually performs the ceremony, the dresses of the bride and bridegroom are knotted together, and they walk hand in hand round the assembly collected to grace their union. There is a feast, and in some places offerings are made to

Gotamji in the wall of the hut, but these with other portions of the rite are Hindu. The girl is placed on the shoulders of her relations, one after the other, one leg hanging down before, one behind, and danced round in a circle, all over the village until she is half dead, and they too weary for further exertion.

In the absence of a Waiti, any elderly member of the family or party may join the pair together. The number of wives is limited by inclination and wealth alone, it rarely exceeds two. The following incident would seem to prove that the bond is not a very strong one. At a shooting party, a man had the misfortune to lose an eye; as the other organ was showing signs of sympathetic irritation, its removal was recommended, but declined, as the sepoy's seven wives—he said—would support him if only blind, but with a blemished one-eyed unlucky husband would have nothing to do. I heard afterwards that they forsook him, in spite of their promises, when blindness ensued. A sepoy had two children born by different mothers on the same day when I was at Khairwára. The girl has no choice in the selection of a husband. Widows may re-marry. The women are very chaste, and rarely have intrigues with strangers. An attempt of this kind on the part of a foreigner lately gave rise to trouble, the whole pál resenting the outrage. The men of the Maiwár Bhíl Corps leave their wives at home, making almost nightly, often very long journeys, to be with them. Large families are not uncommon. An unchaste woman would not be married; if she were, she and her husband would become outcasts. The adulterer is fined 240 Sháhinsháhí rupees (or about Rs. 187 Imperial); if the woman be married, the husband receives the money, and may repudiate his wife if he please, and so she becomes an outcaste, otherwise she escapes punishment. For a virgin the offender pays Rs. 60 (Sháhinsháhí, the Udaipúr currency), and marries the girl. Women may be divorced for adultery, cases being settled by the pancháyat.

Death and Burial.—The Bhíl becomes an old man in his fiftieth or sixtieth year, and is then treated by his people with consideration.

When a death takes place, the body is carried to the burning place, usually near a river, the hair is removed, the corpse washed, and money put in the mouth. It is then placed upon the pile, and the friends walk round with burning wood and then light it. After washing they retire, one of their number coming occasionally to see that the cremation progresses favourably. After having consulted a priest, they go to select the bones, taking with them several small earthen pots, a larger vessel of earth, and a little rice. The latter is cooked, and placed with the large pot, filled with water, upon the ashes, while the bones placed in an earthen vessel are put in the hollow of a tree, and afterwards buried or taken to some sacred spot near or at Khairwára. A bone or some teeth are carried either to the Sámbláji River, the Gotamji

River in the Bánswára District, or to the stream which runs through Baneshwar in the Dúngarpúr District, and thrown in to help the deceased on his way to Paradise, or to prevent the manes troubling the living. Any kind of wood that will burn is used in the pile. The whole ceremony is Hindu, excepting the non-performance of the true *kriya karm*, the breaking of the skull and its attendant ceremonies. Other castes or tribes reject this rite, but they are I believe all lower ones, and the fact may be with them also a link with a life in which their ancestors were not Aryans. On the eleventh day the friends shave, on the twelfth feast *jogis*, and again at the end of the year. No tombs or cenotaphs are constructed, but a few days after death, a relative of the deceased is said to be informed in a dream that the spirit has taken up its abode on a neighbouring hill, whereupon friends and connexions proceed to the place, and erect a platform of stones, and leave there a quantity of food and liquor. There is no tradition of general burial, but the corpse of the first person who dies in a village of small-pox is interred in the earth for a time; if no one else dies of the disease, the body is soon taken up and burnt: Mátá objects to fire, hence the custom. Sir John Malcolm says, that the Vindhya Bhils bury their dead; but in this and many other respects they seem to differ from the race as it exists in Maiwār.

The Bhil man generally wears a dirty rag round his head, the hair being either plaited into a tail or two, or wound up and fastened with a comb of wood, and a waistcloth of limited length. He rarely wears anything more, even at festivals; as a rule he has nothing upon his feet. His arms are the bow and arrow. The bow, with the exception of two links of gut, is entirely made of bamboo, even to the string which is fastened in a very simple but ingenious fashion. A seasoned weapon requires the exertion of some strength in its use. The arrow is a reed tipped with an iron spike, either flat and sharp, or like a nail, or blunt for sport (*vide plate*). The Bhil although very patient is not a good marksman, yet his weapon is a formidable one. His quiver is a piece of strong bamboo matting, and he generally carries in it with his arrows one of hardened wood with a soft piece of tinder-like wood, with which he can produce fire by friction. The weapons are very like those described as in use amongst the Lepchas of Sikkim. They are mentioned in Herodotus as the national weapon of certain Indians; and Sirohí, whence the Bhil arrows come, derives its ancient name 'Sárúí' (Sirohi) from *sár* or *nár*, a reed, a proof of the very great antiquity of these weapons. The men (of position) wear earrings; the whole lobe is bored along the edge, and loaded with little rings usually of gold. The favourite ornament is one which passes behind the whole ear from top to bottom, like the *nath*, or large nose-ring of married women; the same ring there called "pugúl" is worn by the men of the Coromandel coast. The richer men are

fond of jewellery especially the silver waist belts—the *kamarsāl* and *kamar-pattā* of their neighbours. Those who can afford it have guns and swords, but these are not national weapons. They do not tatoo the body. The hair is worn long in their homes, but tied up abroad.

The men usually shave the face, but sometimes wear a beard, as far as I have observed, a scanty one. The head may be shaved, but a top knot is always left. Shaving is a sign of mourning.

Females.—In the villages where there are Hindus, the dress is that of the women about them, but in the hills they generally wear only a simple waistcloth, rather more full than that of the men, reaching half way down their well-formed legs. Occasionally they use the small *kanchli* (corset), worn by the women of Gujarāt, and they adopt the mode of the inhabitants of the same province in dressing their hair, which is parted into little squares, and covered with small globular grape-like ornaments. They wear on their arms and legs the lac and glass *chúrīs* of the poor Hindu; but their national bangles and bracelets are made of brass, and are sharp-edged, rough, and worn smooth by friction alone, often causing ulceration in the process. In a set of bracelets are four rings (*vide* plate)—

1. A plain bevelled ring.
2. One semi-oval in section, grooved across obliquely.
3. A double plain flat ring.
4. A rough grooved ring with an octagonal boss.

Weight for one arm, $6\frac{1}{4}$ ounces.

For the leg are five ornaments—

- 1 and 2. Two plain rings (semi-oval in section).
- 3 and 4. Two flattened sharp-edged ones.
5. A Λ shaped ornament, worn only by married women.

Weight of bangles for one leg, $11\frac{1}{2}$ ounces. Total weight of brass ornaments, $35\frac{1}{2}$ ozs., or 2 lbs. $3\frac{1}{2}$ ozs., an enormous load to drag about the hills, although nothing to be compared with a Hindu *Paṭrání*, who will wear half a maund on a festival day. The young women wear necklaces of beads, and the children are kept without dress to an advanced age; sometimes, however, having a bead or charm by way of pudendal ornament.

Manufactures, &c.—The Bhíl brings in grass and wood and a few supplies to Rájpút villages, where he purchases ornaments, arrows, &c. He collects ghí, and sells it to neighbouring baniás, also honey, which is procured by smoking out the bees with burning cowdung, and then cutting open the comb and catching the honey in an earthen pot.

Agriculture.—The system of agriculture is very rude. The ground is merely scratched below or near the hut of the labourer, and the seed thrown in broadcast. The ploughing takes place during the rains. Wood is burnt as a manure; the fields are surrounded with temporary hedges of

thorn bushes to keep off animals; irrigation is not undertaken from wells by the Bhil proper; well water is used for drinking alone, but for this purpose even he has a more simple contrivance, namely, digging a pit in the dry bed of a river, and thus easily securing an abundant supply by filtration. He loses not a drop of rain, however, if it can be avoided; he builds walls of loose stones, earthed up with soil, across the narrow valleys, and so forms a series of terraces, on which he grows rice, maize, &c.

The pátels or cultivators in the Rájpút villages irrigate and grow many other crops. Indian Corn appears always to have been the staple food. The grain is stored up, the fresh ears of maize are much liked, and the ripe grain in the season costs about twelve annas a maund. Grass is cut on the hill sides and summits, where it seems most to abound, made into bundles, a dozen or more of which are transfixed by a long sharp-pointed bamboo with a peg half way down to prevent slipping, and carried, perhaps, several miles by the women to sell or store up; the stacks are on raised platforms, macháns, or high up in the tree branches. The principal source of wealth is undoubtedly the rearing of cattle on the hills. The women take the cows and goats out to graze on the mountain sides, which have been worn into thousands of paths by generations of animals. A man's position is estimated by the number of cows he has.

Habitations.—A Bhil village, or pál, is a collection of houses scattered sometimes for miles along the sides of the hills. There are no baniás, these with the pátels reside in Rájpút villages or those belonging to Chiefs of mixed blood. A platform of stones and earth is generally erected on the slope of a hill, and on this is raised a loose stone wall; the roof is of timber and flat tiles. In some places, as at Ábú, the villages are mere thatched bee-hives. The huts are substantial, commodious, and clean, often having a courtyard in the centre: the back of the building usually looks towards a hill to enable the owner to flee to its summit when his fears suggest a hostile approach. In the Tracts many deserted and ruined houses may be seen, but a pál itself is *never* abandoned. Sometimes there are the mere platforms on which huts have never been built as safer spots or better soil have been secured, or perhaps more often, their homes have been burnt over their heads by their Rájpút masters as punishment for crime.

The Rájpút villages are built on the sides of hills down into the plains, leaving the Fort of the Chief overshadowing and overawing them above; here, however, the houses are crowded together, and a wall surrounds the whole. In a Bhil pál, the huts are often half a mile apart. A community such as that of Burla, which formerly numbered a thousand houses and three times as many bows, would therefore occupy a considerable extent of country.

Food.—The Bhil rejects nothing, except perhaps home-fed pork, he will eat the bodies of dead animals—and even beef if he dared. Some time

since a Thákur cut off the legs of two eaters of the sacred cow and plunged the stumps into boiling oil. The mainstay, as before stated, is maize, then comes rice; they like goat's flesh, which is most often eaten after being first used as an oblation, fish, and fruit, especially nim (*Azadirachta Indica*) and jámún (*Syzygium Zambolanum*) berries. They preserve caste amongst themselves, especially when Hindus are at hand; they eat together, but two people never use the same plate or leaf. They will drink raw spirits out of a bottle from their hollowed hands or even in a glass, when only their officers are near them—they really enjoy getting drunk; the women do drink, but not to such excess as the men, and if they should be unfortunate, remain indoors, the degrading spectacle of an intoxicated woman is, therefore, rarely seen. Their favourite beverage, which is used on all festive occasions, and which is prepared by the Bhils themselves, or a kalál or liquor-seller, who resides in every village, is the spirit distilled from the flower of the Mhowa tree (*Bassia latifolia*). The Khond and other races use the same spirit, and the bear appreciates the flowers. Every tree has its owner, however remote in the jungle. The liquor is not very strong when made in the villages. I was compelled twice to re-distil some obtained in Erinpúrá before it would burn in a spirit lamp. A four-anna bottle, however, of Phúl Dárú, 'flowery spirit', will rejoice the heart of a Bhíl.

The Bhíl knows little of cooking, he has as furniture a chárpaí, a few kotís or large earthen pots for grain, a brass lotá or two, as many earthen pots, and when there is a baby, a cradle in which to swing it.

His agricultural implements are a rough sort of spade, a kulháí or hatchet, a khantí or crowbar with a sharp point, a khurpá for cutting grass, a plough and a common piece of flat wood which takes the place of a harrow.

Customs.—The Bhíl is taught to hunt by his father and friends; he will shoot small game and not fear to attack large. He is a capital huntsman, tracking and marking down tigers, panthers, and bears, knowing all their haunts, the best places to shoot them, the paths they take and all those points so essential to success in great game shooting; they will remember for years the spots where tigers have been disposed of, and all the circumstances connected with their death.

The Bhíl will himself attack a leopard and, with his sword, aided by his friends, cut him in pieces. No one, not even the Khond, can excel or even equal him in tracking men. He is very skilful in snaring game, and will destroy a hare in this fashion.

A party assembles in an open place surrounded by trees, a hare is started, one man alone shows himself, and runs a few yards after the animal which flies to the edge of the circle, whence another foe darts out and frightens her back, the manœuvre is repeated until at last the poor creature drops from exhaustion.

The hunter is very patient, he will sit for hours to get a chance shot at a fish; should he miss, as he usually does, his arrows float, and when his quiver is empty, he jumps into the stream and brings them out again although the pool may be swarming with alligators.

He is a clever fisherman, often cutting off part of a stream with a network arrangement of stones and bushes, through which the water passes leaving the fish behind, he also nets the stream, swimming into the river to secure his prey. Almost every Bhíl, man, woman, and child, can swim; they generally jump into the water feet foremost, they will dive to great depths and long distances, and to avoid risk from bites of alligators usually go into the streams in large numbers. These creatures they also deter further by striking the water with the foreparts of their feet, progressing Maltese fashion, forming line and shouting. With a line of noisy Bhíls to keep alligators away, a bath in the Maiwár streams and lakes can be very safely indulged in. With these precautions a single Bhíl does not fear to enter the pool to remove his arrows or wounded fish. The traveller may occasionally see large parties of women and children enjoying the pleasure of a good swim in the hill torrents, while some of their friends sit on the banks playing the flute, or herding the flocks.

The forest paths are narrow, necessitating marching in Indian file, a mode of progress which men and women generally preserve when the road is wide enough to walk otherwise.

The Bhíl is an excellent woodman, knows the shortest cuts over the hills, can walk the roughest paths and climb the steepest crags without slipping or feeling distressed. He is often called in old Sanskrit works Vená-púka, Child of the Forest; Pál Indra, Lord of the Pass—these names well describe his character; his country is approached through narrow defiles—Pál or Nál (a causeway). Through these none can pass without his permission. In former days he always levied 'rakhwáli' or black-mail, and even now native travellers find him quite ready to assert what he deems his just rights. It has been stated that when the mutineers of the Cavalry detachment stationed at Khairwára attempted to escape through the hills in 1858-9, they were compelled to return in many instances, as the Bhíls stripped them of everything, even their clothes.

Though robbers, and timorous, owing to ages of ill-treatment, the men are brave when trusted, and very faithful; they have been looked upon by the Rájpúts as wild beasts to be hunted down as vermin, and are now only beginning to feel themselves men. There is a great difference in this respect between the inhabitants of the district round Khairwára and those more remote. At the time the Maiwár Bhíl Corps was raised, it was thought necessary to pay certain Thákurs for their supposed influence over the Bhíls, but their aid in obtaining recruits was almost nominal, and is now useless, as

service in the regiment is so popular, that hosts of applicants appear whenever a vacancy occurs, and men are willing to be drilled for a year or two before receiving pay rather than run the risk of final rejection. At the same time, though earnest good soldiers, they object to serving at a long distance from their homes; they would, however, in all probability not decline a temporary absence.

History proves them always to have been faithful to their nominal Rájput sovereigns, especially in their adversity.

The Bhil is a merry soul loving a jest, the better if a bannia or cheating kotwál be the object of sport.

Laws and Government.—Crimes are almost invariably punished by fine, with in some cases confiscation, and the awards now given have been in use from time immemorial.

The heads of villages and other men of mark form a pancháyat, and arbitrate and adjudicate in all cases both civil and criminal. Such has been always the custom. Where the Rájput has the Bhil in his power, his justice is stern enough, decapitation, burning his pál, &c., for even minor crimes.

Murder.—A murderer was formerly either killed by the friends of the victim or fined Rupees 240 (Rupees 187 Imperial), twelve bullocks, as many goats, and jars of wine, and had a dozen arrows fired into his back. The fine is now the only punishment, the additional penalties have long since been discontinued.

Adultery.—The laws of divorce and punishment for this crime have been already noticed.

Theft.—The thief has to restore twice the value of the property stolen, and is fined from Rupees 5 to 10 Imperial.

Treachery.—In this case there is a general plunder of the possessions of the guilty person, and in addition he becomes subject to any award the pancháyat may afterwards decree against him, should he wish to re-establish himself in his village.

The headman in a village is called a Gammaití. The office is usually hereditary, subject to confirmation of the Rájput suzerain, when he has the will to exercise his power or feels able to support an adverse order. Some of these men are really hereditary Chiefs, and are held responsible for the peace of their páls.

The Bhils are locally very clannish, but have not the elements necessary to form a great people: a man thinks only of his pál and his neighbours, and is unmoved by outward changes of government, which affect him but very remotely. There is no tradition of a king amongst them, although Rájput chronicles mention one, who was succeeded or rather supplanted by the Gahlot, Bápá Ráwul, the descendant of the Balabhi monarchs and ancestor of the Ránás of Udaipúr. Certain chiefs of mixed race, notably Ogúná and

Punarwa, are supposed to have more influence than Rájpúts of pure descent. On the female side these men are Bhíls; they affect, however, to be pure Kshatriyas, although they have certain privileges, such as applying the *ṭiká* or mark of investiture on the forehead of the Ránás of Udaipúr, which are due entirely to services rendered by their ancestors as Bhíls or semi-Bhíls.

Tenure of Property, &c.—The lands are held at the will of the landlord, the Rájpút, nominally. The Bhíl makes a will by calling all his family around him when he is dying, and telling them verbally how he wishes his property disposed of. If he die too suddenly to make a will, the wife and son, if on good terms, succeed, and support the rest of the family, that is, those who were dependent upon the deceased; if not friendly, the wife takes all; in default of wife or son, a brother succeeds, and so on; the daughters and other female relations (except the wife) do not succeed unless by will.

The prominence of the wife in the testament shows that she is looked upon as an equal, while the disposition to a brother in the absence of direct heirs male, proves that there is a desire to keep the property in the family of the man, and to obtain one who will best be able to support the weak survivors.

Quarrels.—Should a quarrel arise, which cannot be settled by arbitration, the inhabitants of one or two or more allied páls turn out and fight with their foes. They let down their long hair and begin the conflict with their bows and arrows—the women looking on encouraging them from the hills and displaying also great bravery and humanity in aiding the wounded of either side indifferently—occasionally seeking a truce for a general refreshment; when rested, they commence again. Very little damage as a rule is done, there is much noise with a great expenditure of arrows, but few are wounded, as they are but poor shots, especially under excitement. They show themselves very skilful in taking advantage of cover, and, I am told, when in the Maiwár Bhíl Corps are quite at home at “Sheltered Trench Exercise”. A dead or badly wounded man generally brings on a truce, which is obtained by the suppliant party waving a piece of cloth or running round in a circle. A noisy talk then ensues, all, however, being still armed, to resume battle at a moment’s notice, should occasion require. The solemn administration of opium (the drug used in most cases of murder and suicide) by the jogís or gammaitís secures peace, and a grand feast and debauch on mhowa spirit follows. Battle is generally preceded by the dance called Ghanna—they have a war-song of loud and very unmusical abuse, with magical incantations and nonsense. Quarrels between individuals are generally settled by arbitration, the more easily as, though quick-tempered, the Bhíls are very good-natured, even in their very rough play. Immediately strangers approach the páls, the Bhíls rush to the hills, attacking only when they feel themselves strong enough to master. When a single man is in

danger, and requires assistance, he brings all his friends around him by raising a peculiar trembling cry the 'kilki' (doubtless from 'kil', a sound; 'kilkilá', a joyous sound), produced by rapidly striking the hollowed hand against the mouth while shouting. The kilki is heard in the hills at a great distance, and is the usual signal for all gatherings, men and women taking it up one after the other.

It may be observed here that Bhils do not run a muck and attack every one they meet indiscriminately, as the Moplahs do, although when inflamed with drink, they will attempt to attack a real or fancied enemy. This remark applies to the race as well as to individuals.

Divisions of time, &c.—Of time little account is taken. The Bhil never knows his own age; one man is a 'jawán', youth, another a 'bhábhá', old man. The month is a lunar one, the year is called "bar" (बरिष).

Sports.—They have no games of chance. The only children's toys are of mud or ears of corn. The boys and men play a game with sticks and a ball made of rags, something like football and hockey combined, without much aim, but with plenty of spirit. They sometimes run races, and enjoy football when at Khairwára, playing without shoes; they prefer, however, sitting quietly talking and singing. They play upon a flute made of a piece of bamboo, pierced with three or four large holes with a hot iron; the sound is sweet and simple without time or rythm. The men often play as they come from the fields in single file, some of the party singing to the accompaniment. Amongst the Mínás two flutes are often played at once, one serving as an echo to the other. It is customary for one man to sing a verse of a song, and for another to reply in a slightly different key. The Mínás in this respect seem to be more advanced than the Bhils; the words of the songs are being constantly varied, but it is probable that the frame-work remains unaltered—specimens are given below. The men are capable of tuition in music; some play fairly in the Khairwára band.

Dancing.—At the Holi, before battle, and at all feasts, the men dance, chiefly the ring dance called "Ghanna".

Musicians take their place in the centre of the circle and begin to play their drums, at first slowly, then more noisily as the performers grow more excited; the men revolve in a ring—now in single, now in double file—sometimes spread out, at others crowded together—now advancing, now receding—again hand in hand, or dancing a *pas seul*. By and by wands appear, one of which each takes in his hand, and as the dancer advances he strikes the sticks of his neighbours, first that of the one to the rear and then that of the one to the front, making a half or whole turn in doing so, all in harmony with the music; he jumps or goes sedately as his fancy moves him. The circle sometimes revolves with, sometimes against, the sun; as the excitement rises, the speed increases, and some of the men, often after letting down their long

hair, go into the centre of the circle, where they dance alone for a while; when weary they retire but not for long. At a great dance at Khairwára, I once saw a bairági with his matted hair, his naked mud-bedaubed skin, his long beard, deer-skin, &c., imitated to the life, greatly to the delight of the Bhils, who every now and then stimulated their countryman, evidently a favourite and noted performer, by their applause and the application of a long pole. Women join in Bhil dances with the men, in the same circle, but not mixed with them, unless they be members of the same family. The dance at the Holi is usually performed without sticks, with hideous yells and songs, the men all besmeared with red powder and excited with wine; such a scene is very suggestive of Bacchanalian orgies, or a dance of devils. Skilled performers exhibit a war-dance, armed to the teeth, and imitate a combat, pretending to fire at each other with bow or gun, flourishing swords in a most real fashion. To be carried on the shoulders of a principal combatant in the mimic fight is considered a great honour.

The *ghanna* is the favourite, the *asl* or true dance of the desert court of Márwár; there women are the performers, their wands are parti-coloured, and these they strike together, in unison, as they glide round the circle, with a very pretty effect. Quite lately the dance was revived at Udaipúr.

It is very curious, that this amusement, which would appear to be very ancient, has been best retained by the most distant court, and the wildest people of India.

Nicolo Conti, the Venetian, early in the 15th century refers to nautes in rings and lines, and to girls having two sticks, which they struck against each other, as a pretty spectacle.

This dance I should imagine to have no connection with solar or planetary worship, the progression being unfixed, neither sunwise nor the reverse.

Diseases.—The Bhils are a healthy race. They dread small-pox—for which they practise inoculation, at present rather avoiding vaccination—and cholera, as evidenced by their reverence for the Hindu deities, who are supposed to be the authors of these disorders. Cholera is not a common disease amongst them, but small-pox is very fatal. The remedy for everything is the actual cautery; few adults, few children, and even animals are without scars. Entozoa are not very common, although the Mínás, very unclean feeders, as far as my experience goes, appear very subject both to *Ascarides* and Tape-worm. Guinea worm attacks almost everybody. In the Indian Medical Gazette of March 1872, I published statistics of 3229 cases of the disorder. All the sufferers were admitted from the men of the Maiwár Bhil Corps in the twenty-seven years ending December 1870, giving a yearly average of 11·95 or at the rate of 30·31 per thousand of strength; $\frac{1}{2}$ were admitted in the six summer months, $\frac{2}{16}$ in September and October, and the remainder in the cold months. The cause of this disorder is not definitely settled, but my impres-

sion is, that the germ enters by the skin, and is mainly due to the filthiness of the people, whose legs often remain coated for days with mud. This is also no doubt a principal cause of the prevalence of skin affection, although poor food and hardship here are powerful aids. The priests are the chief physicians, although most old men are supposed to know something about medicine. Roots and leaves of trees are used in various forms. Here follows a description of a few :

Kathār.—A tree, when 5 feet high used in medicine; if larger, of no value. Its root is bruised and applied to swellings about the jaws.

Paderi.—A tree from 12 to 15 feet in height, the moistened bark of which is applied to the part bitten by the Kālgandha snake.

Tinpattā.—A creeper with a tripartite leaf. The root in use locally for snake bite and swellings.

Emnā.—A tree. The root used in bruises also, with wine and lime juice. If the blood in the wound coagulates, it is said to find its way out by natural channels. The smaller trees only in use.

Sāt or Barā Mūlā.—In fevers accompanied with dry swollen tongue and bad smell. Used to wash out the mouth.

Bhūt Bhangrā.—The powder of a small shrub, to incised wounds, twice a day.

Kajerā.—3 to 4 feet high. In purulent tiger's wounds. Apply twice a day.

Jhamnāth.—A broad thorny tree, 8 to 9 feet high. A piece of the root with a portion of Kajerā (with one knot only in it), once a day in cases of fracture. The limb must be bound. If given twice, two knots are formed in the bone.

Insanity is uncommon, perhaps unknown, as we should expect in a savage race with the mind rude and uncultivated and little to excite it. I have never seen a case of mania, and only one or two of dementia in old age. The Bhils recover well, though slowly, after surgical operations.

Dr. Mullen, in his report on the health of the Maiwār Bhil Corps for 1870, mentions that venereal affections are unknown amongst the people, and my experience agrees with his. Nothing could speak more favourably than this fact with regard to their chastity. Goitre is unknown.

Other Races in the Tracts.—The Bhils to the north and west touch upon the Minās and Mhairs, and in some places dwell in villages inhabited by the former, gradually dying out as the plains of Mārwar are approached. The Minās, according to historical records, were later possessors of the plains than the Bhils. They still dwell in them, and are perhaps less pure, are more filthy in their habits and more treacherous, and have no very peculiar feature of skull as far as I can learn. They and the Mhairs still act as the Muhammadan historian says of Kuṭbuddīn, "They were always shooting the arrows of deceit from the bow of refractoriness."

Country.—It will be only necessary here to describe the country sufficiently to illustrate my previous remarks, and to show how easily the Bhíl could preserve his individuality, and how difficult it would be for foes to dislodge him. The fact that in this very district their nominal masters, the Ránás of Udaipur, successfully resisted the Mughul Emperors and all the hosts of Hindústán, would explain the difficulty these Chiefs themselves would have in keeping the Bhils in order. Important battles have been waged to the feet of the hills, at Chawn near the Debar Lake, at Chitor; but no host has ventured within the Tracts without loss or destruction. The Bhils of Maiwár have their home in that portion of the state, denominated politically the Hilly Tracts, which is nominally under a native official, the Magra Hákim, who dwells on the outer face of the range leading south from the great trigonometrical station of Parshád, but practically for preservation of order under the Political Superintendent at Khairwára. The Bhils are represented in many other districts, but they are here most distinct. The Bhils of the Vindhya Mountains seem to differ somewhat in character from them.

The Tracts extend from Udaipur, south of Gujarát, to the west to the plain beneath Mount Ábú, to the east towards Bánswára, Nimach, and Par-tábgarh. The whole country, comprising the southern portion of the Arávali Mountains, is a wonderfully interlaced series of hills, alternating with defiles, with barely a valley, much less a plain anywhere. Streams pour down every ridge to feed the numerous rivers, branches of the Maihí, Sábarmañí, &c. None are navigable in the Tracts, being either too shallow, or having their rocky beds broken up by boulders and rapids; their courses are very tortuous, hence the roads or paths, which generally follow the channels of the streams, are continually crossing them. I will now briefly describe the main roads through the country, and first the one from Ábú to Khairwára, about 110 miles in length. After descending Mt. Ábú by the Rú-ki-Krishn Ghát, so named from a venerable shrine at the foot of the hill, a plain about five miles wide is crossed, and the district in the Arávalis known as the Bhákar, the home of Míná outlaws, is entered. This is left by a long well wooded, but most difficult pass, which laden camels can hardly cross, and Posiná on the triple border of Idar, Udaipur and the Mahí Kántá soon afterwards reached. Thence one stage to Kotrá the path traverses a plain, a few hills, and crosses many wide streams, much swollen in the rains. The scenery is here most magnificent. Kotrá, a permanent outpost of the Maiwár Bhil Corps, stands in a valley in the midst of rivers, not far from the homes of the Ogúná and Punarwa Chiefs. The next stage to Mánpur runs, for the most part, through a defile worn by a large stream, which is crossed about twelve times in as many miles; the jungle is very dense and the trees are of great size, especially a few remarkable banyans (*Ficus Bengalensis*). Some of the defiles are so deep as to be never illuminated

by the direct rays of the sun. Three or four huge dykes, like walls of masonry, parallel and close to each other, extend across the valley, and have the appearance of having been broken through by the river. In stage number two, the huge Som Ghát, with a torrent bed on one side, is traversed; from the summit a beautiful view of the wildest and roughest part of the district is obtained. The hills are covered with jangal, the bamboo, the true teak, &c., with a dense growth of underwood.

Through the third stage the path is very tortuous, the country more undulating; water is abundant, and the scenery more park-like. Bháwalwára, a Rájput village, is now entered; and the fourth stage, a very varied one, with a pass or two of no great height, a winding road, a lake or two, numerous rivulets with rough boulders in their beds and a peculiar dyke, brings the traveller to Khairwára. This cantonment stands on the banks of a small stream in a valley, the hills adjacent are bare and rounded, the Dhák (*Butea frondosa*) flourishes everywhere, and presents a most glorious spectacle when in bloom.

The second road is the one which runs from Udaipur to Khairwára and thence to Gujarát. The whole of the track between the first mentioned places, about 60 miles long, passes through a similar but rather more open country than that on the Kotrá side. The villages of Rakaknáth and Jáwara merit a separate notice.

At the end of the second stage, Parshád, a defile leads to the plains of Chawnd and thence to the Debar Lake, the largest sheet of artificial water in India. Samblaji, or Samará, on the Gujarát side, until quite lately was only reached by an exceedingly rough road passing through what was called emphatically the 'nál'; here is a lake with a very ancient temple much resorted to by the Bhils, especially at the time of the great winter fair. A good road, in such a district the best civilizer, is now almost completed all the way from Udaipur to Gujarát. Dúngarpur, the capital of the Ráwul of the State of that name, the chief of the Aháriá or more ancient branch of the Udaipur house, is fourteen miles from Khairwára, and is reached by a road passing through a district in which the Ber, or *Zizyphus jujuba*, flourishes in great luxuriance. I was much struck with this before reading in General Cunningham's *Ancient Geography of India*, that this part of the Peninsula (Idar) probably derived its Sanskrit name from this tree.

Geology.—The rocks are the same as those of the main Arávali range system, and are chiefly metamorphic. Capt. Dangerfield in a map attached to a paper on the Geological formation of this district gives the order of strata as follows, beginning to the south of Khairwára. 1. Sandstone. 2. Hornstone Porphyry (noticed at Khairwára). 3. Granite. 4. Gneiss. 5. Mica clay, chlorite slates (these about Jáwara), and again Granite at Udaipur. Blue and red marls with rotten clay stones are very noticeable near Khairwára and beyond Jáwara, at which places the rocks are very hard.

The general run of the longer ridges with the magnetic meridian, the nature of the rocks, and the observation of practical gold miners would indicate the presence of gold; it has been found at Jāwara, the inhabitants of which place produce specimens of less valuable metals as the true one even now. The silver and lead mines of Jāwara are far-famed, and are, perhaps, the same with those mentioned by Pliny as existing to the east of Mons Capitalium—Abú.—No others have been worked in this country in recent times, but local tradition points to a less remote period for the opening of these mines.

Many precious stones are presumed to exist in the hills, but no search is made for them, nor as far as I can learn have many been obtained of late.

In the Administration Report of the Ajmer Districts for 1873-4, an extract is given from a work on Ajmer,* describing the minerals and gems of the Arávali, which summarises all then known of the mineralogy of the range. The emerald is said to be found near Náthdwará, the shrine of an incarnation of Krishna. Iron exists, also zinc and lead, in sufficient quantities to repay working.

Galena is the principal ore, but there are some valuable coloured ones.

Products.—Cattle are reared in large numbers. The forests, if properly conserved, would be of great value. The teak, if left alone, would grow to a large size. Indian corn is the only grain raised in large quantities.

The flora is rich and varied; the fauna scarcely less so. Large game abounds in the hills, fish especially the 'mahser' swarm in the streams, and reptiles are well represented.

Meteorology.—The climate is not an unpleasant one. The average rainfall for twenty years was 26·01 inches, and the mean temperature of the year F. 78·98°. The hottest month was May, F. 93·22°. The coldest, January, F. 64·48°.

Ethnology.—Early in 1874, I undertook a systematic measurement of a large number of Bhils, sipáhís in the Maiwār Bhil Corps, with the following results:

The mean height of 128 males, with an average age of 25·89 years, (calculated as near the truth as records and appearance could make it) was 5 ft. 6·38 in. Of 129, the mean length of the upper extremity 31·56 in. (upper arm 13·81 in., lower 17·75 in.); of the lower extremity, 38·87 in., (thigh 18·71 in., leg 20·16 in.). The upper arm was measured from the head of the humerus to the inner condyle, the lower from the latter point to the tip of the middle finger; the thigh from the anterior superior spinous process of the ilium to the inner condyle of the femur, the leg from the same point to the centre of the sole of the foot resting on the ground. The average length of 79 clavicles was 6·71 in., and as this bone and the hand are usually about the same length, we may look upon the Bhils as a small-handed race,

* By Dr. Irving, Civil Surgeon of Ajmer.

as observation without actual measurements also points out. The mean length of 78 sterna was 6·84 in. Special measurements were made of the head and other portions of the frame.

Of the 129 men, not one reached the type or average, which may be regarded as a true one, as the means of separate twenties taken in the order of examination approaches for all measurements the means of the grand totals. This may not be deemed extraordinary when we remember that the very constitution of society requires that there should be a slight differentiation from the type. This of course is most noticeable in the expression of the countenance, but it no doubt exists throughout the body,—the type may of course be found amongst a larger number of men.

The Head.—The antero-posterior diameter of 129 heads was 7·21 in., the lateral 5·66 in., the depth from vertex to chin in eighty-one cases 8·05 in. The ratio of length to breadth was as 100 : 79·22, the true ratio—the means of averages of scores being almost the same. Taking the proportion of 80 to 100 as the dividing line, all above being brachy, all below dolicho-cephalic, the Bhil skull is but very slightly dolicho-cephalic, very different from the long thin walled crania of the pure Hindu. Again, as opposed to the latter, the parietal tuberosity is well marked, the occipital hardly at all. The face is orthognathic. A Bhil is generally very dark, his hair black, straight and long, his face smooth with slight moustache, rarely having beard and whiskers, eyes dark with the palpebral apertures limited in size, making the eye look small. The iris is sometimes grey, as in Gújars and other low caste Hindus. Chest, rarely hairy. Face large, wide, almost round. Forehead of fair height, rather more square than amongst Hindus; vertex of skull, flatter. In some cases, however, (almost exclusively where the men were of mixed race) the roof of the skull seemed to begin in the centre of the forehead, thus rendering the facial angle, measured in the ordinary way, appear large, and not affording a correct indication of cranial capacity. Eyelashes and eyebrows ample, bridge of nose broad and sunk, nostrils dilated very round, nose slightly retroussé, broad, clubbed at the tip, and rather more varied than the dead level organ of the Hindu, which, however well shaped, bears little indication of character.

Mouth large, lips thick, inexpressive, sensual, giving the impression that they were made merely to cover the teeth, which are large and coarse. Zygoma very large and salient. Cheeks full. Molar bones flat and prominent. Ears large and prominent, and very moveable. Jaws evenly hung, massive, lower square, large in proportion, angles square, large and widely separated.

Expression amiable, but timid. Long and strange habit, more than inherent race peculiarity, I believe to be responsible for many of the characteristics of the Bhil's head. He has been an outcast for ages, hunted by his neighbours, and so timid has he become, that even when he sees the men of his own tribe, soldiers in the Bhil Corps, passing peaceably through his district,

he flies at once to the highest hill for refuge, a prey to his own fears. The dilated large nostril, the moveable and prominent ear are very suggestive of distrust. His food is of the coarsest, the hardest Indian-corn, and to masticate this his teeth are all very large, the dentine of the very toughest and roughest description; the incisors are square, broad, fixed vertically in the gums, but are generally flat instead of sharp at the edges, bearing marks like those of the horse, approaching the molars in appearance. These teeth are also very large and strong, and to carry them of course there is the huge jaw, which necessitates large muscles, to accommodate which there must be wide and projecting zygomatic arches, the beginning of a broad skull. It is quite possible, therefore, that the difference between the Bhil and Hindu crania may have been produced by the long action of a different kind of food; measurement of the skull would therefore appear to give no certain proof that the races are distinct, but if the historical and philological differences are as marked, it would confirm them strongly. In the Vedas, the ancient inhabitants of India are spoken of as *Dasyus* or enemies; they are the goat-nosed, the noseless, the black skinned; they are taunted with eating raw flesh; and we may prove that there was some foundation for the expressions thus made use of in the case of the Bhil, if he were what he is to-day. We have found that his nasal organ is ill-shapen, broad with large nostrils, a striking contrast with the nose of the Bráhmaṇ, the typical and perhaps only unmixed Aryan, for it has been stated that there are no *Vaisyas* or *Kshatriyas* of pure descent and few *Sudras* even, these having been unable to preserve their identity during the long sway of Buddhism. The Bhils and aborigines generally, for those very reasons which prevented them from becoming a prey to the Aryan invaders (presuming them to be non-Aryan), namely their distance in the South, and their inaccessibility in the hills, were likewise enabled to resist the influence of the followers of *Sákya Muni*. The Bhil is almost black, and with regard to his flesh-eating propensities hardly an abhorrer of anything, and it is considered I believe that the historical proofs of distinction are forcible enough, but the craniological and philological certainly are less so.

Amongst the men measured were some *Grásiás* and *Mínás*. These could be at once told by their pyramidal long skulls, and are supposed to be hybrids.

Arms.—The Bhils are not a long-armed race, and have no great muscular strength; nor are those movements, which require facility of manipulation, easily performed.

In the *Mahábhárat* it is mentioned that as a penalty for fighting against the royal Krishna, the Bhils were condemned to lose the forefinger of the right hand, that they might never again enter into conflict with the friends of the hero (whom one slew, however); hence it is said they never use the forefinger in drawing the bow; but times have changed since then. I noticed, however, in examining their hands, that few could move the fore-

finger without the second, indeed the fingers appeared useless as independent members of the hand. This may no doubt be a mere result of their savage condition, which does not necessitate fine movements. In connection with this may be mentioned their apparent inability to distinguish colours, or count numbers—due alone to their want of words, to express themselves.

The Lower Extremities.—The Bhil leg is fairly developed, best amongst the women—all are good walkers.

The measurements of circumference are for the neck, upper arm, chest, thigh and knee, in one hundred and twenty-eight cases, respectively inches 11.52—8.04—30.25—15.95—12.23; the averages of pelvis and leg respectively, inches 26.91 and 11.7. It will be noticed that the broadest part of the calf is not as in the case of most Europeans as well developed as the knee. The Bhil does not grow up to the capacity of his bones, he is not sufficiently well nourished. Both chest and pelvis are small.

The mesaticephalic skulls are said to be those of the civilizers. Judging from this the Bhil then must be capable of improvement, and all the care bestowed upon him shows that the remark is true.

Comparative Table of Bhil and other Race Measurements.

RACE, CASTE.	Age.	Height.		CIRCUMFERENCE OF							
		Ft.	In.	Neck.	Upper arm.	Chest.	Pelvis.	Thigh.	Knee.	Leg.	
European, ¹	21	5	5.63	..	..	34.53	..	..	..	..
Castes below Baniá, ..	30	5	8.7	11.17	8.19	30.5	26.96	15.7	12.31	11.63	
Bhil,	25.89	(²) 5	6.38	11.52	8.04	30.25	(²) 26.91	15.95	12.23	(²) 11.7	
Tibetan Tribes.	Amdoan, .....	..	5	8.5	..	Forearm 11.	37.	..	21.	..	15.5
	Horpa, .....	..	5	7.5	..	9.75	33.	..	16.75	..	13.75
	Gyarung, .....	..	5	3.	..	10.	35.5	..	18.75	..	14.
	Manyak, .....	..	5	4.	..	9.5	3.7	..	19.5	..	13.5
Orissá.	Juangs 20,	31.25	5	1.5	12.38	9.75	31.75	..	17.5	..	..
	Búrians 20,	30.25	5	2.4	11.25	9.13	31.5	..	17.13	..	..
	Uriahs, all castes 20,	37.5	5	3.5	11.5	8.75	31.	..	16.	..	..

¹ From Liharzak's tables, many thousand cases in Vienna. ² 128 cases.

Comparative Table of Bhil and other Race Measurements—(continued).

CHEST REGULATIONS FOR RECRUITING, 1875.														
RACE, CASTE.	LENGTH OF					HEAD.		STERNUM		Tribe.	Age.	Height.	Chest.	
	Upper arm.	Lower arm and hand.	Leg, upper.	Leg, lower.	Clavicle.	Length.	Breadth.	Depth.	Length.					Length to breadth of Head.
European, .....	..	..	..	..	..	7.8	6.63	9.17	8.39	85.38	Sikhs, Pathans, &c.	24 years.	5/6 to 5/8	34
Castes below Banis,	13.75	17.81	18.6	19.83	7.	7.35	5.58	8.33	7.35	74.84	Do.	Do.	5/10 upwards.	35
Bhil, ^a	13.81	17.75	18.71	20.16	6.71	7.21	5.66	8.05	6.84	79.22	Hindustanis, Hindus, Dogras, &c.	Do.	5/6 to 5/8	33½
{ Amdoan,	12.	19.	20.	16.5	..	7.75	6.5	8.5	..	83.87	Do.	Do.	5/10 upwards.	34½
{ Horpa,	12.	17.75	19.	17.	..	7.75	6.	8.5	..	77.42	Lads, if growing.	16 to 20	....	31½
{ Gyarung,	11.5	17.75	18.5	15.	..	8.	6.87	9.	..	85.87	Do.	22	....	32½
{ Manyak,	11.25	17.25	19.	17.	..	8.	6.87	9.5	..	85.87	....	..	....	..
African (Kabli), ..	..	..	..	..	..	..	..	..	..	73.89	....	..	....	..
Todas, .....	..	..	..	..	..	..	..	..	..	72 to 75	....	..	....	..

^(a) 128 cases. ^(b) 79. ^(c) 81. ^(d) 78; rest, 129.

Language.—A few specimens of songs of the Bhíls are appended, with some in the Miná dialect of Sirohí. In addition to illustrating the difference in disposition between the two people, they will serve as examples of their languages, the latter being evidently a rough form of Hindí, while the former, although understood (with difficulty) by a Bráhmaṇ of Jaipur, and as such classing with the coarser variants of this tongue, contains a large number of words and letters of non-Sanskritic origin.

It will be noticed that the Bhíl contains a majority of words in which the cerebrals ढ ढ, ढ ढ, ढ ढ, ढ dh, ण n, with the ढ ढ and ढ dh changeable into dull r, (letters which in Sanskrit itself are probable Scythian) prevail. In some words, ल l changes to र r or ढ ढ, as in 'pílá' to 'pírá'; in others, च ch to स, as in 'chaláo' to 'saláo'—but these changes (as in the Miná 'Sirohí' to 'Hirohí', where s and h are permutable) exist in Márwáří, Gujarátí, &c. In Bhíl, as in these ruder forms of Hindí, the long vowels o, á, é (i), ú, are most used; kh and sh, kh and ch च, j and g, b and v or w, are generally permutable—h and s are also.

As far as my observation goes, the Bhíl uses most words from the language of the people next to him. His tongue, an unwritten one, varies therefore with the linguistic frontier, whether Gujarát or Márwár; he is able to pronounce English words with unusual clearness, a proof that in language he is singularly susceptible to outward influence, and that for him to have retained a distinct tongue, would have been impossible. Nevertheless as he converts into or adopts most readily non-Aryan forms, words, and letters, there is every reason to believe that he once had a Scythic or, at all events, a mode of speech which was not Sanskrit. It will be noted that the Miná, who is more connected with the dweller in the plains, has been linguistically more affected than the Bhíl. I append a few specimens of Bhíl and Miná names, as these no doubt change less than other words: female Bhíl names end in é long (i), the male of which would end in á and ó.

Vocabulary, Grammar, &c.

Man	bhábhá, ádmí, manak. <i>Plural</i> , háí ádmí.
Woman	bairí.
Father	átak, dájí, átá, báp, dádak. <i>No plural</i> .
Grandfather	dádak.
Mother	ái, má.
Sister	bahin, bahinái.
Elder sister	bái. Younger sisters are known by their names.
Boy	káuró, suró, sorá. <i>Boys</i> , súra.
Girl	káurí, surí, sorí.
Friend	gothíyo, guthiyo, haithí.
Enemy	bairí, berí.

Bull	dábó. Cow, dáhí, gáé, go.
Devil	bhút. Female devil, churail.
Horse (clay)	garno. Stone horse, túthá, paráno, síro.
Calf	renṛú. Calves, renṛúá.
He-goat	bokarro, bakro. She-goat, chhálí.
Sheep	dobí, bhehí.
Dog	kútṛo, ú. Bitch, kútṛí.
Cock	kúkro. Hen, kúkṛí.
Cobra	háp.
Snake	kóṭ.
Crow	kágro.
Squirrel	khalí, khárol, garúrí.
Hare	háho.
Fish	múthali, másalu.
Deer, male	dolí, haran, harún.
Head	múd, münd, mátho, máthún.
Hair	wál, yár.
Eye	ánkh.
Ear	kán.
Tooth	dánt.
Hand	háth.
Foot	pog, paghan. } No plural.
Nails	nakh.
Arms	bán.
Knees	gúda.
Horns	hingdá.
Blood	lúi, lúhí.
Bone	hádká.
Leg	pallí, pag.
Thigh	háthal, pagní, háthor.
Sky	ábláo, abha.
Sun	dáro, vasí, súraj.
Moon	chánd, sánd, vasí.
Star	tára.
Water	páno.
Stone	páná, páno.
Vegetable	harno, bhájí.
River	náíí, nadí.
Grass	sár, chár.
Way	wát.
Day	dúro.
Night	rátúr.

Tree	rúkhrar, rúnbhro.
Fire	bádí, deutá, dewatá.
Mountain	dúngar, magro.
House	ghar.
Well	kúra, kúó, náw.
Basket	kúndlí, húnbhlo.
Bread	rota, roto.
Shoe	khayro, jufo.
Bed	khátlo.
Dish	thamro.
Grain	dáná, náj.
Clothes	selrú, labra, katka, chíthrá.
Money	dúkrá.
Book	wahíro, puthí.
Flour	lot.
Salt	mítho, lún.
Bow	dhúní, kamtú.
Arrow	hariyo.
Red	rátro.
Blue	kílo.
Yellow	pírá píro.
To hang	galwáhi.
„ lift up	hana.
„ throw	dar ná.
„ see	bhalná, juwini.
„ run	dhámo.
„ walk	limdra, limdu.
„ find	jardhanú.
Good	hálúí, ekját, nagd, hán.
Bad	bodá, budú, khráp.
Warm	úno.
Cold	tharo, tar.
Great	moto.
Small	náplo, lofo.
Behind	valte.
Now	ewán.
Near	tharmen.
Hither	immá.
Thither	parme.
One	ek.
Two	be.
Three	tin, taran.

Four	sár.
Five	páns.
Six	sái, sí.
Seven	hát.
Eight	áth.
Nine	nán.
Ten	do.
Twenty	ví.
One hundred	ho, pansví.

Pronouns.

I, mhú.	<i>masc.</i> , úmo.	} úmá.
	We, <i>fem.</i> , úmái	
Thou, tú.	You, túmá.	
He, ye ve.	<i>masc.</i> , vá.	} whí.
She, váí.	They,	
It, whay, vo.	<i>fem.</i> , vái	

Comparison of Adjectives.

A good man	Háwú mának.	
A better man than that.	Waná se tajo	} hai.
	„ ek zát	
	Son ek zát	} hai.
	nagd	
Best man	Ye mának bejah	
	haglah.	

Verb.

I give,	Mhú álún.
I gave,	Mhú aldeda.
I will give,	Mhú albo hún.

No other tenses.

Sentences.

What are you doing ?	Túmá kúnkro ho ?
Go there,	Parne jawájú.
Come here,	Im } áo. Tumá awajú.
	Inja }
Sit down,	Behjí.

Are you well?	Túma háwú ho?
I am well,	Mhú háwú húi.
Are you hungry?	Túma bhúkhjá ho?
To come,	A'wún.
Come,	A'yo, áyún.
I will come,	Mhú áwe.
Thou wilt come,	Tú áwe,
He will come,	Ye awe he.
She will go,	Ve or pelí jahe.
They will go,	Vai pelá jáhe.
„ (women) will go,	Pelí jáhe.
We „ „ „	Umai jáha.
To run,	Dhám vú.
Run,	Dhámo.
I will run,	Mhú dhámhún.
They will run,	Va dhámhe.

Names.

Bhil Males.	Bhil Males.	Bhil Females.	Míná Males.	Míná Females.
Káná. Dhanjí. Khanjí. Húkpa. Jaglá. Manía. Vajía. Lálá. Dalá. Khemá.	Rúplá. Khatú. Bálá. Pemá. Umrá. Púnjá. Hámjí. Hírjí. Manjí. Mandrúpá.	Kehrí. Lálí. Jámlí. Manglí. Khátrí.	Urjan. Dúngá. Chátrá. Chotú. Bírmá. Harjía. Barmálá. Málá. Zálam. Govindá. The names of gods common.	Phatí. Bhúrí. Deo. Kaní. Jánkí. Rúkmá. Udí. Shání. Lálí. Jámrí. Sábo. Kishní. Búli. Pání. Biblan. Korí.
Habjí. Manglíá. Jewá. Mogá. Húklá. Kánjí. Bírjí. Homá.	Daulá. Sabjí. Nathá. Ratwá. Kúrú. Goklá. Kúberá. Kherá.	All these names, if the í be changed to á or ó, become male. Conversely, the male become fe- male.	Sálgái. Rákhá. Bhojá. Nánjí. Harlá. Panjía. Sheolá.	

Amongst Mehtars, Gújars, and other low castes, a few of these names, or some like them, are found, but more often the people are called after a god.

The Song of a Bhil in which he explains to his Uncle Dolá the approach of the British, their power, and wealth, and asks whether he shall join them or not at Khairwárd, their Head Quarters.

Ugyaní dhartí jú tarkí áwelá, Dolá kákájí.	Oh ! Uncle Dolá, the Turks are coming from the East, Uncle Dolá.
Hú amwáre tháre áwilágo, Dolá kákájí.	They have arrived on the banks (of the Sóm river), Uncle Dolá.
Kake áyángo paráw kare, Do.*	And have halted there, U.*
Lilá píra tanbúra tanáwe, Do.	And pitched their variously-coloured (blue and yellow tents), U.
Súná ke ríkhúti edham káráo, Do.	And have made their golden tent-pegs, U.
Rúpá ke ridúre kesáwáo, Do.	And stretched their ropes of silver, U.
Liláje pírá tanbúra tanwáo, Do.	Raise the coloured tents, Uncle Dolá.
Yadre paroře nagarán báge, Do.	Their drums are beating in the drum house, U.
Ehaṇ tháko paráwe útháwe, Do.	From this place strike their camp, U. (i. e., if you do not approve).
Ke fojaṇ wáro laskar sálo áwe, Do.	Oh, a very great army is coming, U.
Dhúṇdhro dhúṇdhróre khere lo úre, Do.	And is raising dust like the morning fog, U.
Uggo súraj nílogán khójáe, Do.	Which obscures the sun, U.
Gúre lájí kheriá úre, Do.	The horses are raising a cloud of dust, U.
Gúre lájí dhúmar ramti áwe, Do.	The horses, leaping and jumping, come, U.
Unṭarlán to gágartán áwe, Do.	Camels grumbling come, U.
Háthirán to halá áwe, Do.	Many elephants are coming, U.
Áwilágo khákhri áne sere, Do.	They have arrived at the border village, U.
Khánkhri áno rájánátho jáere, Do.	Having arrived on the border, the Rájá has run away, U.
Jakhere jáhoje jákhere bhágo, Do.	If you do not fight, you also must run away, U.
Rastere áwúje máre márengé sálú, Do.	They are coming and will kill you on the road, U.
Fojaṇ lípri áni jaga bháro, Do.	The army has halted, go to another place, U.

* Do. for 'Dolá kákájí'.

* U. for 'Uncle Dolá'.

Fojar lí topar se ráwrán bhátrán, Do.	The army will hált on the bard's ground, U.
Ketrán thán ko pařáwene kare, Do.	They will not halt elsewhere, U.
Lílá píra tañbúřá tañáwe, Do.	Putting up the coloured tents, Uncle Dolá (<i>i. e.</i> , if you approve).
Soná ke rikhúťí ekhe áwe, Do.	Preparing the golden tent pegs, U.
Rúpá ke ridoře tañáwe, Do.	Stretching the silver ropes, U.
Unťarlán pídhání Gangá bháro, Do.	They are bringing much Ganges wa- ter on camels, U. (proving their wealth).
Unťarlán pídhá to píhe ráwránre- ťan, Do.	The bards are shouting on the camels, Uncle Dolá.
Háthírán pídhání jagá bháro, Do.	Shew a place for the elephants, U. (if you do not run).
Háthírán go píhe ránránretán, Do.	A separate place for elephants, U.
Gořelá pídhání jagá bháro, Do.	A separate place for the horses, U.
Gořelá píhe ránránretán, Do.	Shew the place, o rájá, U.
Rawá gajelán dasří gáere, Do.	Prepare for all the other animals, U.
Gánří áno rájáná gejá ere, Do.	The Rájá of Gánří has fled, U.
Rágáre náhene ráńí náhe, Do.	The rájá and rání have fled, U.
Ráńíre náhene báníe náhe, Do.	The queen and merchants have fled, U.
Mathere dupalá nesori enáhere, Do.	Every body with his property on his head has run away, U.
Báreere barasní khañńí mánge, Do.	They require a camp for twelve years, U.
Ter barasno dhúmo mángere, Do.	They want thirteen years' tax (that is in the twelve years), U.
Nakhere náhone nakhere bhágo, Do.	If you do not agree (to pay the tax), run away, U.
Dhúmore bharone pásáre pharo, Do.	If you can give the tax, return (in place), U.
Kharní bharo to pásare pharore, Do.	The camp is fixed, then return, U.
Kharni bharání natháre pás, Do.	If you do not agree, do not stay, U.
Kharníre barso to pásre pharso, Do.	If you agree to the presence of the camp, then return, U.
Kharake kharake jak to áwe, Do.	From village to village conquering they come, U.
Kharak máhe to khañņo jhagro báge, Do.	Opposing villages are forced with the sword, U.
Jawás men go dolá bhúmiá báje, Do.	In Jawás lives the Thákur Dolá (the owner of the soil), U.

Hūṇ to māre dolá gúwájúre, Do.	What I have seen, I have told, U.
Kharake kharke jak to áwe, Do.	Having beaten the villages on the road, they are coming, U.
Khairwára mahe kúnre rágá báje, Do.	Who is living in Khairwára, U.?
Khapro go bhágone paráw kará, Do.	Take your sword or fly, U.
Khairwára meñ aṭhako paráw ne kare, Do.	If you fly, do not stay in Khairwára, U.
Jawás máthe bhúmi ká rájá báje, Do.	In Jawás rules the lord* of the soil, U.
Jawás máthere dolá ṭhákori báje, Do.	In Jawás rules Dolá Ṭhákur, U.
Khairwára mahe jáe kare bhárore, Do.	If you agree, go, prepare a home at Khairwára, U.
Lilá ne pirá tanbúrá tanáwe, Do.	Raise the coloured tents, U.
Soná ke rikhúṭi gharwáro, Do.	Knock in the golden tent pegs, U.
Rúpá ke ridore khesáyó, Do.	Pull the silver ropes, U.
Jawás máthe kúpre bhúmiá wájé, Do.	In Jawás what Lord of the soil rules, U.?
Jawás máthe dolá ṭhákori báje, Do.	In Jawás lives Dolá Ṭhákur, U.
Kharak máthe khápro magro báje, Do.	In the village is a hill fort, U.
Kháprore bhágone paráw kanrore, Do.	Fly to the fort and stay there, U.
Jehán thako bhúri ote báje, Do.	In his own lands he is ruler, U.
Jehán thako paráye ne kare, Do.	If you go there, no one can hurt you, U.
Thúri ká máregá gánegúere, Do.	A small place is necessary for me, U.
Jehán thakí kí jágá barí lídí, Do.	Prepare a good place in his land, U.
Khaprore bhágáne paráw kí do, Do.	Why do you flee? halt there, U.
Bhúriāṇ to banglá lege, Do.	The English have houses everywhere, U.
Bhúriāṇ aprágí ne báje, Do.	The English have left no place, U.
Bhúriāṇ koine gere māṇrawe, Do.	The English to this day have not taken his village, U.
Ewáre nokarí maṇáwe, Do.	Go there and become his servant, U.
Bhúriāṇ ekí kánbále, Do.	The English are one caste, U.
Búgal báje nokari sále, Do.	When the bugle sounds, work begins, U.

* The Jawás Chief was pensioned with a view of obtaining his aid in recruiting amongst the Bhils.

Te áge kór nokarí ne sále, Do.	No other service is like theirs, U.
Málwá náthe kawáj karwáore, Do.	In Malwá is also held a parade, U. (The Málwá Bhil Corps.)
Hawá pór din sarí gasore, Do.	At 10 o'clock go visit them (i. e., after parade) U.
Dolá káká bár bethíne gáore, Do.	Uncle Dolá, do you stay or go?
Khalak naren núririán pharangí, Do.	The English are everywhere masters, U.
Náwre útaríne bhúrián áwe, Do.	The English come in ships, U.
Húngo máre dolá júwáj are, Do.	I am speaking, but you are not answering, U.
Dariá máthe náwe salávú, Do.	The ships come on the sea, U.
Náwe máthe gúrelá úgáro, Do.	They put their horses in the ships, U.
Náwe máthe háthir úgáro, Do.	They put their elephants in the ships, U.
Náve máthe phojár lí úgáro, Do.	They put their army in the ships, U.
Havá kháwa bairíone báje, Do.	They blow their music, do not beat, (as with drums), U.
Dariá máthe náwe áiyenire, Do.	A ship full of arms on the sea is coming, U.
Húndarí sálere bájene nawe salere, Do.	Hindu soldiers with music also are in the ships, U.
Nawe útarí ne bhúrián áwere, Do.	Having landed, the English are coming, U.
Hún to máre kharak gúwája ere, Do.	I have only a sword, U.
Dola káko thákor bárí baithene jáere, Do.	Uncle thákur Dolá go see and think, U.

The same in Devanágari.

उमयणी धरती जु तरकी आवेला दोला काकाजी
ऊ अमवारे ठारे आवीलागो दोला काकाजी
कके ये आयांको पड़ाव करे दोला काकाजी
लीला पीरा तंबुड़ा तगावे दोला काकाजी
सुना के रोषुटो अधम काराओ दोला काकाजी
रुपा के रीदुरे घेसावाओ दोला काकाजी
लीलाजे पीरा तंबुड़ा तगावाओ दोला काकाजी
यदरे परोड़े नगारां वागे दोला काकाजी
येहां ठाको पड़ावे उठावे दोला काकाजी

के फोजां वारो लसकर सालो आवे दोला काकाजी
 धुंधरो धुंधरोरे घेरे लो उड़े दोला काकाजी
 उगगो सुरज नीलोगां घोजाये दोला काकाली
 गुड़े लाजी घेरीयां उड़े दोला काकाजी
 गुड़े लाजी धुमर रमती आवे दोला का०
 उंछड़लां तो गांगड़तां आवे दोला काकाजी
 हाथीड़ां तो हला आवे दोला का०
 आविलामो घाघरी आने सेरे दोला का०
 घांघरी आने राजानाठो जायेरे दोला का०
 जघेरे जाहेजे जाघेरे भागो दोला काका०
 रसतेरे आवुजे मारे मारेगे सालु दोला का०
 फोजड़ लीपड़ी आनी जगा भारो दोला का०
 फोजड़ ली तोपड़ से रावरां भाटड़ां दोला का०
 केचां ठां को पड़ावेने करे दोला का०
 लीला पीरा तंबुड़ा तणावे दोला का०
 सेना के रीपुटी अये आवे दोला काका०
 रूपा के रीदोरे तणावे दोला का०
 उंछड़लां पीधानी गंगा भारो दोला का०
 उंछड़लां पीधा तो पीहे रावरारैटां दोला का०
 हाथीड़ां पीधानी जगा भारो दोला का०
 हाथीड़ा गो पीहे रावरारैटां दोला का०
 गाड़ीला पीधानी जगा भारो दोला का०
 गाड़ीला पीहे रावरारैटां दोला का०
 रवा गजेलां दसड़ी गायेरे दोला का०
 गानड़ी आने राजाना गेजा अयेरे दोला का०
 रागारे नाहेने रांगी नाहे दोला०
 राणीरे नाहेने वांगीये नाहे दोला०
 माधेरे दुपला नेसारी अेनाहेरे दोला०
 वारेरे वरसनी घंगी मांगे दोला का०
 तेर वरसना धुंमो मांगेरे दोला का०
 नघेरे नाहेने नघेरे भागो दोला का०

धुमेरे भरोणे पासारे फरो दोला का०
 घरणी भरो तो पासारे फरोरे दोला०
 घरणी भरानो नथारे पास दोला०
 घरणीरे भरसे तो पासारे फरसे दोला०
 घड़के घड़के जक तो आवे दोला०
 घड़क माहे तो घांड़ो मगरों वागे दोला०
 जवास मे गो दोलो भुमीच्या वाजे दोला०
 ऊं तो मारे दोला गुवाजउरे दोला०
 घड़के घड़के जक तो आवे दोला०
 घरवाड़ा महे कुणरे रागा वाजे दोला०
 घांड़ो गो भागोने पड़ाव करा दोला०
 घरवाड़ा में अठाको पड़ावे ने करे दोला काका०
 जवास माथे भुमी का राजा वाजे दोला०
 जवास माथेरे दोला ठाकोर वाजे दोला०
 घरवाड़ा महे जाये करे भारेरे दोला०
 लीलाने पीरा तंबुड़ा तणावे दोला०
 सोना के रोघुटीच्यां घड़वारे दोला०
 रूपा के रीदारे घेसाये दोला०
 जवास माथे कुणरे भुमीच्या वाजे दोला०
 जवास माथे दोलो ठाकोर वागे दोला०
 घड़क माथे घांड़ो मगरों वागे दोला०
 घांड़ारे भागाने पड़ाव कणरीरे दोला०
 जेहां थको भुरी ओते वागे दोला०
 जेहांथको पड़ाये ने काड़े दोला०
 थुड़ी का मारेगा गानेगुअरे दोला०
 जेहींथको की जागा वरी लीदी दोला०
 घांड़ारे भागाने पड़ाव की दो दोला०
 भुरीअं तो बंगला लेंगे दोला०
 भुरीअं अपरागी ने वागे दोला०
 भुरीअं कोईने गेरे मांडवे दोला०
 अवारें नीकरी मड़ावे दोला का०

भुरीछं एकी कांवाले दोला०
 वुगल वागे नोकरी साले दोला०
 ते आंग कोर नोकरी ने साले दोला०
 मालवा नाथे कवाज करवा ओरे दोला०
 हवा पोर दिन सड़ी गसारे दोला०
 दोला काका बार बेठीने गाओरे दोला०
 घलक नरेन नुरेरीछं फरंगी दोला०
 नावरे उतरीन भुरीछं आवे दोला०
 ऊंगो मारे दोला जुवाज अरे दोला०
 दरीआ माथे नावे सलावु दोला०
 नावे माथे गुडीला उगारो दोला०
 नावे माथे हाथीड़ उगारो दोला०
 नावे माथे फोजड़ली उगारो दोला०
 हवा घावा वैरीओने वाजे दोला०
 दरीआ मांथे नावे आयेरणोरे दोला०
 हंदरी सालेरे वाजेने नावे सालेरे दोला०
 नाव उतरी ने भुरीछं आवेरे दोला०
 ऊं तो मारे घड़क गुवाजा अरे दोला०
 दोला काको ठाकोर बार बेठेने जाओरे दोला०

Song of a rich merchant Atúji Matúji on pilgrimage to the Jain shrine of Rakabnáth, near Khairwárá.

Atúji Matúji mári ramtíre gáurí	Atúji Matúji is coming with me
awegi.	from Gujarát.
Alíhan jisar kore khúdá wo mári	Make a good road, he is coming with
ramtíre gáurí awe.	me.
Mári ramtí gáurí áwe kálere kesarí	To the Lord of Saffron, he is coming
ámári ramtíre, &c.	with me.
Atúji Matúji mári ramtí gáurí áwe.	Atúji Matúji is coming with me.
Agere saláwoke mári ramtígáurí áwe.	Go before, he is coming &c.
Samrájī ní wáté mári, &c.	In the Sámblají (a temple) road he is,
Agere saló mári, &c.	Go before he is, &c.
Motere parúre mári, &c.	At three o'clock at night, &c.
Bánswárá märke mári, &c.	In the Bánswárá road, &c.
Líbojī bhímogíre mári, &c.	The heads of Líboj and Bhímoj are
	coming, &c.

Dāṇre sūkāwo mārī, &c.	Pay the tax and guide, &c.
Hūṇto va vasīne bhetwājīú mārī, &c.	I am going to worship at Rakabnāth, he is, &c.
Aṭújī Maṭújīre mārī, &c.	Aṭújī Maṭújī is, &c.
Agere salāvo mārī, &c.	Go before, &c.
Dāpsú ká wāre mārī, &c.	Pay the guide, &c.
Vavasine bhetwágá úre mārī.	I am going to worship, &c.
Ho rúpīa rúkṛá álore mārī.	Give a hundred rupees in cash, &c.
Khairwárá já máro mārī, &c.	In the Khairwárá road he is, &c.
Sáṭīre bhísábhīs mārī, &c.	In the middle of the way, he, &c.
Kágdar wárá mārge mārī, &c.	In the Kágdar road, he is, &c.
Dāṇre sūrā vo mārī, &c.	Pay the guide, &c.
Ho rúpīa rúkṛá álore mārī, &c.	Give a hundred rupees, &c.
Hañ kó gāri hankore mārī, &c.	Pay the cart hire, &c.
Júojī huṅgo darsan karvá gáu mārī, &c.	Look I am going to worship.
Sámragí jí vate re mārī, &c.	In the Sámbrají road, &c.
Kesriane goṛe mārī, &c.	Before the Lord of Saffron, &c., (Rakabnāth).
Darsan ne kí dāṇ mārī, &c.	Having worshipped, &c.
Paṛáwe útáro mārī, &c.	Shew the encamping ground, &c.
Nawe notore alo mārī, &c.	Go into the new Serai, &c., (at Khairwárá).
Jahán paṛáw karo mārī, &c.	Half there, &c.
Paṛáwne kí do mārī, &c.	I have halted there, &c.
Vávasīne bhetīre go mārī, &c.	We have worshipped* at Rakabnāth.

The same in Devanāgarī.

अटुजी मटुजी का गीत ॥

अटुजी मटुजी मारी रमतोरे गांड़ी आवेगी
अलीहं जोसड़ कोरे पुदा वो मारी रमतोरे गाड़ी आवे
मारी रमति गाड़ी आवै कालेरे केसरी आमारी रमतो गाड़ी आवे
अटुजी मटुजी मारी रमती गाड़ी आवे
आगेरे सलावोके मारी रमती गाड़ी आवे
समराजो नो वाटे मारी रमतो गाड़ी आवै
आगेरे सालो मारी रमतो गाड़ी आवे
मोटेरे पखड़े मारी रमती गाड़ी आवै

* Merchants and seths (bankers) often travel with an immense following to this great shrine.

वांसवाड़ा मारगे मारी रमती गाड़ी आवै
 लीबोजी भेसोगीरे मारी रमती गाड़ी आवै
 दाणरे सुकावो मारी रमती गाड़ी आवै
 हं तो वावसीने भेटवाजीउ मारी रमती गाड़ी आवै
 छटुजी मटुंजीरे मारी रमती गाड़ी
 आगेरे सलावो मारी रमती गाड़ी आवै
 दाणसु का वारे मारी रमती गाड़ी आवै
 वावसीने भेटवागा उरे मारी रमती गाड़ी आवै
 हो रूपीआ रुकड आलोरे मारी रमती
 घेरवाड़ा जा मार मारी रमती गाड़ी
 सालीरे भीसाभीस मारी रमती गाड़ी आ
 कागदर वारा मारगे मारी रमती गाड़ी आ०
 दाणरे सुरा वो मारी रमती गाड़ी आवै
 हो रूपीआ रुकडा आलोरे मारी रमती गाड़ी आवै
 हांको गाड़ी हांकोरे मारी रमती गाड़ी आवै
 जुओजी ऊंगो दरसण करवा गाउ मारी रमती गा.
 सामरागी जी वाटे रे मारी रमती गाड़ी आ०
 केसरीआने गोड़े मारी रमती गाड़ी आ.
 दरसण ने की दां मारी रमती गा.
 पड़ावे उतारो मारी रमती गा.
 नवे नातेरे आलो मारी रमती गा.
 जेहीं पड़ाव करो मारी रमती गाड़ी आवै
 पड़ावेने की दो मारी रमती गाड़ी आवै
 वावसीने भेटोरे गओ मारी रमती गाड़ी आवै १

The Song of a Mína woman to her Lover.

Hálene Abúre jáiyán Mán̄si.

Go, O man, to Abú.

Abúre nasarti rá mára pagrá dhújan
lágá.

Going up Abú, my limbs tremble.

Hálene Naki náwa jáyfen dorá káng-
si bhúlaayí jire dostdári.

In bathing in the Nakí Lake,* I forgot
my hair ribbon and comb, oh
friend !

* The Nakí Lake is on Mount Abú.

Dorá ne kangsiyájire bhúl áyi dos-dárán.	I have forgotten my ribbon and comb, my friend.
Tháre ne mári jorí Parmeswar púri dedí are jire dostdárán.	Oh friend, God has made us a perfect pair.
Hálene sáoní para jáien are jire dostdárán.	We will go to a far-off place, oh friend.
Mahanriyáne máti ne Korhathá ne mánsiyá.	Oh man, let us leave my vile husband.
Hálene pardesi jáien hálene mánsiya.	Come, go to another land, come, oh man.
Parne ne bis de pare máre ne re mánsiya.	Give my husband poison, oh man, and come away.
Hálene pardesi jáien re mánsiya hálene pardesi jáien.	Come to a distant land, come oh man.

Song of Ketúri Mína to her lover's brother Senú.

Húbí ne játe thire Senúrá háth ko miliyáne.	Oh Senú, I was going for thatching grass, but did not meet him.
Timá wálá Kangáro láre ne lágore tanko Tímá wálá.	Tímá's son, Kangáro, the strong son of Tímá did not go.
Mahá lawírá dhedha Mína main korhe tine.	The Máhálánvirá Mína, (her husband,) is a skinner (very low), I will not stay with him.
Tímá wálá kangáre pará jáien re tanko tímáwálá.	Oh! Tímá's son, Kangáro, the strong son of Tímá, take me to another land with you.
Honá rán már dariyán re Senúrá kadí ko pariyané.	I did not wear golden armlets in his house. Oh! Senúra (he was poor).
Dhíri tobá Khetúri honárrán lánúre tanka tímá wálá.	Have patience, Khetúri, the strong son of Tímá will bring you gold bracelets.
Máragíone páre re Senúrá Mondará rú pare.	Oh! Senú, rob in the road, in the road of Mondará.
Khetúri Randíre mándariyán ləwere tanká Tímá wálá.	Oh! woman Khetúri, the strong son of Tímá will bring you armlets.
Mína rá jagerá kangará hadái hadái lino.	Kangáro always fights with other Mínas.
Rájpútará jagra kangará hamkái ledáre tanká Tímá wálá.	This time, Kangáro, Tímá's strong son, must fight the Rájpút.
Nánáure Beráre Kangará wár pare ne áye.	The people of Nánán and Berá are after Kangáro.
Bhágone bhágore Senú bhái Káiya-ne tere.	Why do you flee, brother Senú?

Nánáure berá re wár par áye re tan- ká Tímá wálá.	The men of Nánán and Berá are on the road, strong son of Tímá.
Pelíne golí Senúrá tárá bháire pare lágí.	The first shot has grazed your bro- ther's foot, oh Senú!
Bhá krí ra gadí menkángará godí paréwale ne.	At the foot of Bhákrí hill, Kangáro has bent his knee.
Nánán re berá re Senú bhái Rajpút pare háro.	The men of Nánán and Berá, brother Senú! Slay the Rájputs.
Tírná Kánúto Senú bhái háth men ne rá lene.	Oh, brother Senú, take bow and arrow in hand.
War ne wále Senú bhái ekhí ne jíúta choro ne.	Do not leave a man living in the road, brother Senú.
Rájputáre márene to kángára garhe párún mariyo.	Having killed the Rájputs, return home, Kangáro.
Rájputáro jagro Senú bhái jíta na- áyere tanka, Tímá wálá.	Oh, Senú brother, having conquered the Rájputs, come with the strong son of Tímá.
Mándariyá káná Keturí itirá Ráj- pútára re tanká, Tímá wálá.	For Ketúrí's bracelets, the strong son of Tímá has slain many Rájputs.

Song of Mánká Mína, a Sirohí rebel.

Parbatí ne sonára lere, Mánká Mína.	In the early morning, take the omen, Mánká Mína.
Daurá háth ne mátá bolíre, Mánká, Hanotrá.	On the right hand speaks the shámá bird, Mánká Mína, Hanotrá (his tribe).
Mátá Bhavání belíre aiyí re jo.	Mother Bhavání* is pleased with you.
Jáwáli rú dárú ro rúláo re, Motiy- ará.	Go to Jáwáli, men, and bring wine.
Párdi wetán láwere bák rárán láore, Motiyára.	Bring, men, a goat from Párdí.
Mátá ne bákrá márone, Motiyára.	Oh men, sacrifice a goat to Mátá.
Táre mátá ne belí aiyire, Mánká Mína.	Your mother approves, Mánká Mína.
Hálore káldáre kí bhaiyán re láo, Motiyára.	From Káldáre, bring a buffalo, men.
Káldará rán Rájput ganna tánkore, Mánká Mína.	The Rájputs, Mánká Mína, are very strong.
Káldárerá Rájputáne ko bitenere, Motiyára.	Do not, men, fear the Káldáre Ráj- puts.

* The goddess Devi.

Káldárená Bháiyán re leore, Mánká Mína.	We have brought the Káldár buffaloes, Mánká Mína.
Káldáre Báhar aiyere, Mánká Mína.	The Káldáre men have come out, Mánká Mína.
Bhágáne bhágá kaiyán, Motiyára.	Do not run away, men.
Bhágáne bhágor ghano algore, Motiyára.	Do not run, Bhágor mountain is very far away, men.
Ab tír ne kámto taiyar para karone re, Motiyára.	Prepare your bows and stretch them, men (towards the foe).
Ab katári kád múnk men ne leore, Motiyára.	Take your daggers in your mouths, men.
Galiyára pútí ghorán kaiyáanne díní, Múkandjí Rájpút.	Múkandjí Rájpút, why do you go after the cowherds and not after (men).
Mánká Mína, medan men úbá hai, Múkanjí Rájpút.	Mánká Mína is standing in the plain.
Ek ne gwáliyáro paro múá re, Mánká Mína.	One cowherd is fallen, Mánká Mína.
Múkanjí ne paro máre nere, Mánká Mína.	Mánká Mína, kill Múkanjí.
Háre ne Rájpút pare márore, Mánká Mína.	Kill all the Rájpúts, Mánká Mína.
Dhartí men amár nám rákhdíyáre, Mánká Mína.	Your name will remain immortal in the earth, Mánká Mína.
Nirá thaká jáwálpúrá ne márore, Mánká Mína.	If you rob Jáwálpúrá in the midst of the road, Mánká Mína.
Jamí men amár nám rakh díyáre, Mánká Mína.	In the land, your name will be immortal, Mánká Mína.
Tárine máta bhalo jal mo, Mánká Mína.	Your mother has made you great, Mánká Mína.
Ek húhú gwáliyáne baiyán parededere, Mánká Mína.	Give a hundred buffaloes to each of our cowherds, Mánká Mína.
Jálore náthone ho bhoíyon dere, Mánká Mína.	Give a hundred buffaloes to the Jálor* ascetics, Mánká Mína.
Ráj ne darbár men nám terá raiyáre, Mánká Mína.	In the royal darbár, your name is known, Mánká Mína.
Dhartí men amár nám rákhiyone, Mánká Mína.	In the earth, your name is immortal, Mánká Mína.

* Jálor. A celebrated fort and town in Southern Márwár, held by the Náthas, or split-ear ascetics.

Note.

The following Extract from the Political Report of the Superintendent of the Hilly Tracts of Maiwár may be of interest in connection with my remarks on the religion of the Bhils.

"A reformer, Súrjī, a Bhíl Guru, has for some years past been at work among his countrymen on the Maiwár-Gujarát frontier. He preaches worship of one God, peace and goodwill. His followers take an oath to abstain from all crimes and offences, spirituous liquor, and from causing death to any living thing. They bind themselves to live by the produce of the soil, and to bathe before eating. Súrjī has now a following of upwards of one thousand "bhagats", or believers, and three disciples, Gurus, ordained by himself to preach and convert.

"I saw and conversed with him in February last when I was travelling in the district. He asked for protection to his followers in Dúngarpur territory, where the other Bhils, he said, annoyed them by calling them "Musalmán" (with them meaning 'infidel'). His influence in securing followers has spread as far as Khairwára and Kotrah.

"I talked with a number of his converts, and they said that they had prospered since they had been guided by the Guru to do as they had sworn. They certainly looked in every way superior to their unreclaimed brethren."

With reference to the above, Mr. Lyall, the Agent for the Governor-General, observes that "All over India, the appearance of teachers of this cast of mind among the non-Aryan tribes may be noticed." The 'Pioneer' of December 29th, also quotes the 'Evangelical Review', which describes the rapid progress of conversion to Hinduism among the Mhairs, due mainly to the presence of high caste Hindus from the North West Provinces amongst them (in the Mhairwára Regiment) as drill instructors. A similar movement was also noted in the Deolí Irregular Force.

These facts are very interesting in connection with the remarks made in my paper, and show the universal desire of the wilder tribes to rise in the social scale. Rájpútáná is a great centre of religious revivalism and change. The Rámsnehis, having their head quarters at Bhílwára and Sháhpúra in Maiwár; the Dádú Panthis at Narána near Sámbar; and other sects, seem to hold views similar to those of Súrjī, the Bhíl.

Popular Songs of the Hamirpur District in Bundelkhand, N. W. P.—By
VINCENT A. SMITH, B. A., B. C. S.

In the belief that any contribution which serves to add to our knowledge of the languages and customs of India, will be welcome to the Society, I now submit a sample of the popular songs of the Hamirpur District in the local dialect. Nowhere can the real popular language be better studied than in the songs which are constantly in the mouths of the people, and these compositions further illustrate vividly the domestic customs and manners of the masses.

Should the specimen now submitted prove acceptable, I propose to continue the series from time to time. I have already collected a large number of songs of various kinds, but at present I have not leisure to work up my materials. So far as I am aware, none of these songs has ever before been reduced to writing. They have now been taken down by my paṇḍit, who is a native of this district, from the lips of persons who learned them by tradition. The paṇḍit was instructed to record accurately, without alteration or correction of any kind, the sounds which he heard, and I believe that my instructions have been carried out. At some future time, I hope to analyze the dialectic peculiarities of the songs which I am now collecting. In order to render the following set of ditties intelligible, I prefix an abstract of the

Legend of Hardaul.

Hardaul, a son of the famous Bir Singh Deo Bundelá of Orchhá, was born at D a t i y á.* His brother Jhajhár Singh suspected him of undue intimacy with his wife, and at a feast poisoned him with all his followers. After this tragedy, it happened that the daughter of Kunjávatí, the sister of Jhajhár and Hardaul, was about to be married. Kunjávatí accordingly sent an invitation to Jhajhár Singh, requesting him to attend the wedding. He refused and mockingly replied that she had better invite her favourite brother Hardaul. Thereupon she went in despair to his tomb and lamented aloud. Hardaul from below answered her cries, and said that he would come to the wedding and make all arrangements. The ghost kept his promise and arranged the nuptials as befitted the honour of his house. Subsequently, he visited at night the bedside of Akbar, and besought the emperor to command *chabútras* to be erected and honour paid to him in every village throughout the empire, promising that if he were duly honoured, a wedding should never be marred by storm or rain, and that no one who

* Bir Singh Deo died in 1627 A. D. For some account of him, see *Gazetteer*, N. W. P., Vol. I, article Orchha; *Ain translation*, I, pp. XXV, 488.

first presented a share of his meal to Hardaul should ever want for food. Akbar complied with these requests, and since that time Hardaul's ghost has been worshipped in every village. He is chiefly honoured at weddings and in Baisákh, during which month the women, especially those of the lower castes, visit his *chabútra* and eat there. His *chabútra* is always built outside the village. On the day* but one before the arrival of a wedding procession, the women of the family worship the gods and Hardaul, and invite them to the wedding. If any signs of a storm appear, Hardaul is propitiated with songs.

I am told that it is a common saying that cholera has only been known since the introduction of Hardaul worship.

SONGS IN HONOUR OF HARDAUL.

हरदौल का गीत ।

I.

१ दतिया के लला हरदौल तुम्हारी कजा जगत जाहिर भई
कहना से दल ऊमहे कहना परो है मिलान दतिया से दल
ऊमहे एरक् परो है मिलान एरक् को क्या मेलनो लाला खर
पानी को टूट ।

लौटके मैलौ टकटकौ लाला चरै वक्केड़े दूब ।

लाला निकरे देश का देत भनेजन भात बुन्देला देशा के रैया
राव के तुम्हारी ।

दखिन बनी तरवार । १ ।

II.

२ जलमत खाये गीतिया हेते खाये माई बाप ।

चन्दन रुख कंठायकै राजा माई के ।

दाग दिवाव ।

माई बाप काहू के सदा न जीवै भैया दाहिनी बांह ।

झंसुवन भौंजे चूनरी रोय करे कुइलान विघ दार मा विघ भात
मा विघ की बनाई रसखीर ।

गाँवन २ चौतरा लाला देशन २ नाम बुन्देला देशा के रैया राव
के तुम्हारा जय राखै भगवान । २ ।

* This day is known by the name of *tel*.

III.

- ३ पाँच बताशा नौबोरा लाला यही ठाकुर का भोग ।
काँधले घौरा काँधले मोरी बहिनी ।
विस्मृत जाय ।
आँधो पानी जिन करा लाला जिन ।
बरसावे मेह ।
बुन्देला देशा के रैया राव के लाला ।
भौजो के परम आधार । ३ ।

IV.

- ४ अपना बैठे राह मा लाला औरन को पक़ताय ।
माटी को यो ठेकरा लाला धरो आदमी नाम ।
बुन्देला देशा के रैया राव के तुम्हारी ।
दखिन बजी दरवार । ४ ।

Translation.

I.

Hardaul, the darling of Datiyá,² your fame is brilliant in the world.
Whence comes the host³ exultingly, where has the halt been made?
From Datiyá comes the exulting host, at Erichh has the halt been made.

At Erichh why did you halt, dear boy, where fodder and water fail?
Turn back and halt at Taktakan, dear boy, where your cattle may graze on dúb⁴ grass.

Our⁵ darling comes out on a long journey, to offer his sister's daughter boiled rice.

You are a Bundelá chief of chiefs, in the south your sword has been busy.

II.

At⁶ the time of your birth, your clansmen, your father, and mother perished.

O King! have sandal wood cut and fire put to your mother's pyre.

No man's father and mother live for ever;⁷ a brother is as a right arm.

With tears of unrestrained weeping the garment⁸ was wet through:
poison⁹ in the pulse, poison in the boiled rice, of poison was the rice-milk made.

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In every village, darling, is your *chabútra*, in every region your name is known.

You are a Bundelá chief of chiefs, God grant you victory !

III.

Five¹⁰ sweetmeats, and nine balls of betel and *pán*, darling, these form the repast of the god.

'Take,¹¹ take your load on your shoulders, white bullock ; my sister will be thinking of me.'

Darling, don't send storm or shower, don't send rain. You are a Bundelá chief of chiefs, the best support of your brother's wife.

IV.

Darling, you sit by the roadside yourself, and take thought for others.¹²

To¹³ an earthen potsherd, darling, is given the name of man. You are a Bundelá chief of chiefs, in the south your sword has been busy.

Notes.

¹ These songs are sung by women, the specimens now given were obtained by my Pandit from *pardah-nishin* women.

² Dativá, now a small separate state in Bundelkhand, was formerly included in Orchha ; vide N. W. P. Gazetteer, *sub voce*.

³ The verb *ámhná* conveys the idea of abundance, or exuberance, and of joy or exultation. The allusion here is to the troop of attendants whom Hardaul's ghost led to the wedding.

⁴ A fine kind of grass (*Cynodon dactylon*).

⁵ It is the duty of the brother of the bride's mother (*mámá*) to make this offering to the bride on the first day of the wedding ceremonies.

⁶ Hardaul's relatives died when he was born.

⁷ Hardaul performed a great service to his sister by doing the honours of her daughter's wedding.

⁸ A spotted garment (*chúnri*), worn by women.

⁹ Alludes to the mode of Hardaul's death.

¹⁰ *Batásá* is a special variety of sweetmeat. All the principal kinds are enumerated in a *halwá*'s song.

Ten *birás* make a *gilaurí*, and 100 *birás* make a *dolí*. The meaning of the verse is that Hardaul should make the usual offering to the gods before starting.

¹¹ Hardaul has now started, and admonishes the refractory bullock which carries the wedding gifts.

¹² *i. e.*, your sister.

¹³ *i. e.*, Man is but dust, and like Hardaul all must die.

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THE PHILOLOGICAL SECRETARY.

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"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES.  
~~~~~

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ERRATA

IN

JOURNAL, ASIATIC SOCIETY OF BENGAL, FOR 1875.

PART I.

-
- Page 27, l. 33, put the [] before 'but such was.'
- „ 30, l. 11, *et passim*, for *Ṭughluk* read *Tughluk*.
- „ 31, l. 11, for *Muhammad Súri* read *Muhammad-i-Súrí*.
- „ 32, l. 4, from below, for *Arab* read *the Arab*.
- „ 33, l. 10, the semicolon belongs to the end of the preceding line.
- „ 34, l. 14, for *history* read *history is*.
- „ 36, l. 1, for *shortly* read *stoutly*.
- „ 37, l. 1, for *ul-Mamálik* read *wa Mamálik*.
- „ 58, l. 3, from below, for *ngto* read *nglo*.
- „ 68, l. 19, put an H. before 'makhū'.
- „ 276, l. second note. Add—General A. Cunningham, C. S. I., identifies ادوند بهار with the Otanta Vihára, mentioned in Vassilief's 'Bouddisme' (French Translation, p. 56).
- „ 281, line 7 of the note, for *son* read *sons*.
-



Photostereographed at the Surveyor General's Office Calcutta.

ANGAMI NAGA of CHEDEMA.



Photomicrographed at the Surgeon General's Office Calcutta.

ANGAMI WOMAN of KHONOMA.



Photographed at the Surgeon General's Office, Calcutta.

SOIBANG VANGAM of CHOPNU, BORMUTAN.



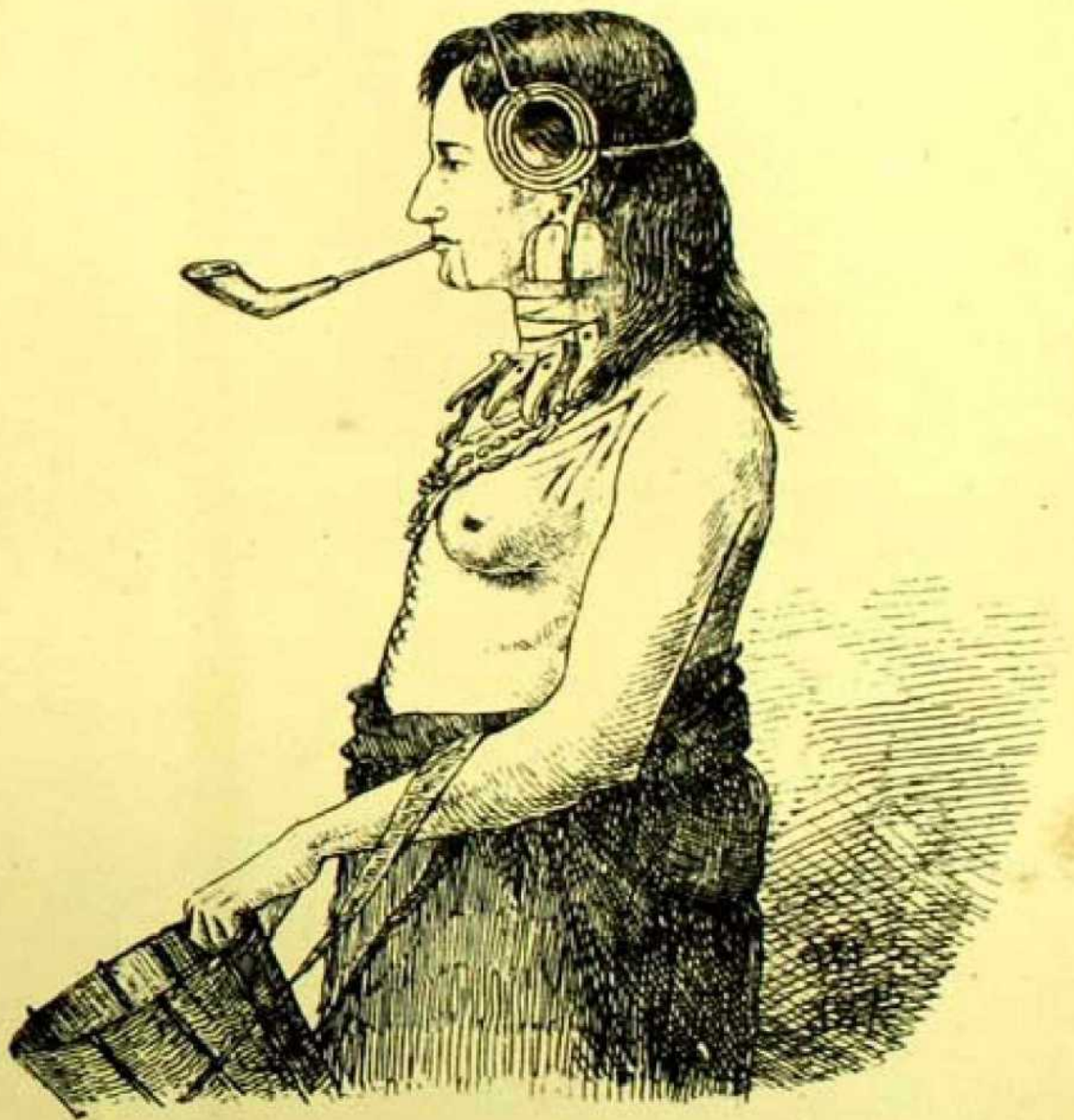
Photoincographed at the Surveyor General's Office Calcutta.

PHEMI, WIFE of SOIBANG.



Photocinnographed at the Surveyor General's Office Calcutta.

HATIGORIA NAGA, MAN.



Photoincographed at the Surveyor General's Office Calcutta.

ASSIRINGIA NAGA, WOMAN.



JOURNAL OF THE ASIATIC SOCIETY.

Part II.—PHYSICAL SCIENCE.

No. I.—1873.

- I.—*Descriptions of New Species of Mollusca of the genera Helix and Glessula from the Khasi Hills and Munipur.*—By Major H. H. GODWIN-AUSTEN, F. R. G. S., F. Z. S., &c.—Deputy Supt. Topogl. Survey of India.

(Received Sept. ;—Read Nov. 4th, 1874.)

(With Plate I.)

The following shells were obtained in the above hills between the years 1868 and 1873, when I was employed in the survey of that tract of country; the work afforded opportunities of visiting almost every part and of bringing together a very large collection of the land and freshwater shells, a complete list of which I hope some day to draw up.

HELIX DELIBRATA, Bs., var. *FASCIATA*, Plate I, Fig. 1.

Shell openly umbilicated, depressedly globose, rather solid, pale ochraceous epidermis; spire slightly raised, in some specimens quite flat, very prettily striped with brown concentric bands, one or two of which are broader and more pronounced than the rest, especially on the base of shell; some specimens are ornamented with a single band only, last whorl expanding towards aperture and slightly descending; aperture sub-oblique, circular, peristome thick, white, and reflected.

Major diam. 0.82, minor 0.67, alt. 0.38 in.

Hab.—On the high open grassy country of the West Khasi Hills.

True *delibrata*, Bs. unbanded, with flat spire, and a larger shell, is also found in the Khasi Hills.

HELIX (NANINA) ATRICOLOR, n. sp., Plate I, Fig. 2.

Shell imperforate, depressedly conoid, very strong, colour varying from rich bright brown to greenish ochre, pure brown or ochre near aperture, with a glassy surface finely striated; spire flatly conoid, whorls $6\frac{1}{2}$, periphery rounded, flat at base; aperture sub-oblique, broadly lunate, peristome well thickened and slightly reflected near the columella.

Major diam. 0.93, minor 0.85, alt. 0.45 in.

Animal quite black throughout, tentacles long with the extremities paler, extremity of foot short and glandular, as in *Nanina decussata*, Bs.

Hab.—On the higher parts of the North Cachar Hills, never seen to the westward of that portion of the range, and tolerably abundant in certain spots. The colour of the animal is its most distinctive character, shells of this group of *Helices* being very similar, and the characters of the animals of great importance; I may mention as an instance *N. petrosa*, Hutton, found in damp ravines on limestone at Mussoorie, which has been confounded with other species and the animal of which is almost black; by this character it is identified at once and is rendered a very good species.

HELIX (NANINA) SHISHA, n. sp., Plate I, Fig. 3.

Shell depressedly turbinate, imperforate, exceedingly thin, brittle, transparent, pale greenish horny, sharply keeled; whorls 5, ornamented above with fine and even ribbing, quite smooth at base; aperture oblique, semicircular, lip thin.

Major diam. 0.6, minor 0.51, alt. 0.3 in.

Hab.—Two specimens were found, the one at Moyong, north side of the Khasi Hills, and the other at Nenglo, Naga Hills, in damp forest, but such a fragile form would be probably abundant during the rainy season, and like so many others only then to be seen.

Animal not seen, but in all probability is naninoid. In the plication of the upper surface it is like *N. plicatula*, W. Blf. (J. A. S. B., 1870, Vol. XXIX.) a species the animal of which had not been observed at the time when the shell was described. I now give a short description of it:—pale brown, mottled very evenly with umber over the head and sides, a distinct line of darker colour down the centre of back; tentacles rather thick at base, moderately long gland at extremity of foot, which is rather truncate; length 1.25 inch.

GLESSULA ORTHOCERAS, n. sp., Plate I, Fig. 4.

Shell very slender and elongate, pale grey or white, very finely and regularly ribbed throughout, very solid, apex blunt; whorls 13 to 14, slightly rounded, suture well impressed; aperture oblique, rounded below, outer lip sharply edged and continued as a well developed callus upon the strong thickened columellar margin.

Length 2.32, major diam. 0.4 in.

Hab.—Abundant on the nummulitic limestone of the West Khasi Hills, particularly near Nongumlai, where the finest specimens were collected; a smaller variety occurred on the peak of Laudomodo on gneiss, and was not so solid. This species can be at once distinguished from *G. Casiaca*, Bs. by its white colour and by the absence of the dark brown epidermis that covers the latter; the whorls also are much more rounded, whereas in *Casiaca* they are nearly flat. It is very close to *G. obtusa*, W. Blf., brought from Yunan by Dr. J. Anderson, but is altogether a larger shell and differs in its general form.

Fine *Glessula Casiaca*, I only found to the eastward in the Naga Hills, whence, I suspect, Griffith's specimens were obtained and sent to Benson, who imagined they were from the Khasi Hills.

GLESSULA ILLUSTRIS, n. sp., Plate I, Fig. 5.

Figured in 'Conchologia Indica', Pl. 102, Fig. 9.

Shell elongately oval, greenish horny, finely striated longitudinally; whorls 7, very slightly rounded, suture moderately impressed, the lip thickened, columellar margin slightly curved and strong, apex blunt.

Length 0.75, major diam. 0.3, length of aperture 0.3 in.

Hab.—Hengdan Peak, North Cachar Hills, at 7000 feet, in forest, also near Nenglo at 6000 feet and in the Lukah Valley, Jaintia Hills, at 1000 feet.

This species is an elongate and larger form of *Glessula crassilabris*, Bs., of which *G. pyramis* is a closer variety; but its much more elongate form and stronger striation make it a good connecting species with *G. Butleri* described further on. The form from the Lukah Valley is a tumid departure from the type figured.

One specimen—alt. 0.75, major diam. 0.38 in.

Another „ „ 0.65 „ 0.35 „

I look on all these species as properly varieties, and *G. crassilabris*, very abundant in all the grass country of the Khasi Hills, may be taken as the type; a difference in elevation and condition of habitat, from damp dark forest to hot grassy slopes, having produced modifications of form.

GLESSULA BURRAILENSIS, n. sp., Plate I, Fig. 6.

Shell turreted, elongate, solid, in fresh state brown and lustrous, finely longitudinally striated; whorls 10, rather flat, suture shallow, apex blunt; aperture sub-vertical, fusiform, angular above, peristome very thick, paler brown on margin, columella strong.

Alt. 1.37, major diam. 0.4 in.

Hab.—The finest specimens were collected under the Peak of Khunho, Eastern Burraile Range; they were also abundant under Japvo at about 7000 feet.



This species is an extremely elongate, solid form of the *crassilabris* section of *Glessula*—and one of the most distinct.

GLESSULA BUTLERI, n. sp., Plate I, Fig. 7.

Shell elongately turreted, very thin and brittle, tumid, pale corneous, glassy, very minutely striated, apex very blunt; whorls 8, rather rounded, suture deep, body whorl much swollen and capacious; aperture vertical, pear-shaped, lip rather thin.

Alt. 1·13, major diam. 0·45 in.

Hab.—Eastern Burrail Range at 6000 feet—not a common form.

I name this shell after Captain J. Butler, Political Agent in the Nágá Hills, with whom I had the pleasure of being associated when mapping that very interesting and beautiful district.

EXPLANATION OF PLATE I.

- | | | |
|------|----|---|
| Fig. | 1. | <i>Helix delibrata</i> , var. <i>fasciata</i> . |
| " | 2. | <i>H. (Nanina) atricolor</i> . |
| " | 3. | " " <i>Shisha</i> . |
| " | 4. | <i>Glessula orthoceras</i> . |
| " | 5. | " <i>illustris</i> . |
| " | 6. | " <i>Burrailensis</i> . |
| " | 7. | " <i>Butleri</i> . |

II.—*Descriptions of four New Species of Mollusca belonging to the family Zonitidæ from the N. E. Frontier of Bengal, with drawings of Helicarion gigas, Benson and of a variety of the same.*—By Major H. H. GODWIN-AUSTEN, F. R. G. S., F. Z. S., &c., Deputy Superintendent of the Topographical Survey of India.

(Received Sept. 1874,—Read January 6th, 1875.)

(With Plates II—III.)

HELICARION SHILLONGENSE, n. sp.

Animal ochre colour, the mantle being slightly paler than the rest of the body, there is no longitudinal streaking on the side of the foot, which, viewed under a lens, is covered with minute protuberances evenly distributed; foot beneath dull ochre brown.

Shell horny, thin, long and narrow, pale green in colour. (Plate II, Fig. 1a).

Length 0·9", diam. 0·28."

The dimensions of these creatures are not so easily taken, the different parts expanding and contracting alternately.

Extremity of foot to posterior end of the mantle,...	1.9	inch.
Mantle,.....	1.5	
Anterior end of mantle to head,.....	0.9	

Total, 4.3

Eye tentacles,	0.42
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HELICARION SHILLONGENSE, var., Plate II, Fig. 1.

Animal dark umber brown, body concolorous, the mantle a shade lighter, nearly covering the shell in both varieties, the foot beneath is ash-coloured; when taken fresh there is a slight indentation at the anterior edge of the mantle (*vide* fig.). Shell as in fig. 1 a.

Extremity of foot to posterior edge of mantle, ...	1.70	inch.
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Mantle,	1.70
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Anterior end of mantle to head,	0.95
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Total, 4.35

Eye tentacles,	0.45
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Hab.—Shillong and North Khasi Hills. Both these forms are near *H. Theobaldi*, but may be distinguished at once by the absence of the white stripe on the edge of the left lobe of the mantle, and by the longer form of the shell. The tentacles are longer than in *H. brunneum*.

HELICARION BRUNNEUM, n. sp., Plate II, Fig. 2.

Animal a rich brown, mottled on the mantle with dark sepia, distinctly marked with parallel streaks, that extend from a zigzag line running along the side of foot, the margin of which is edged below with a series of short parallel markings; foot beneath dark ochre. Large portion of shell exposed, which is of same form as that of *H. Shillongense*.

Dimensions when fully extended:

Extremity of foot to posterior end of mantle,.....	1.5	inch.
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Mantle,	1.6
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Anterior end of mantle to head,	0.47
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Total, 3.57

Eye tentacles,	0.32
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Breadth of body,	0.56
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Hab.—Shillong, Khasi Hills, in grassy localities.

HELICARION NAGAENSE, n. sp., Plate II, Fig. 3.

Animal ochre colour, prettily mottled and dotted with a darker shade of the same, the mantle covers nearly the whole shell; a narrow white line, commencing near the posterior margin of the slit disclosing the shell, extends round towards the respiratory orifice on the right hand side, and in

front another line curves round to the left anterior side (fig. 3*b*). Mucous gland as in *H. gigas*. Length about 3 inches.

Shell ovate, exceedingly thin and brittle (fig. 3).

Major diam. 0.90, minor 0.55 in.

PARMARION? RUBRUM, n. sp., Plate II, Fig. 4.

Animal of a fine orange pink, grey on under side of the foot; tentacles short, mantle entirely covering the shell, with only a slight trace of a longitudinal opening running back from the anterior left side, three parallel bands of greenish grey along the back of the neck, the eye-tentacles being of the same colour. The gland at extremity of foot with a long, overhanging lobe,

Extremity of foot to posterior end of mantle, 0.9 inch.

Mantle, 0.8

Anterior side mantle to head, 0.4

Total length when moving, 1.8

Shell quite rudimentary, minute, granular (fig. 4*b*).

Major diam. 0.14 in.

Hab.—Kohima, Nágá Hills, in brushwood.

The mucous gland in this species differs considerably from that of *Helicarion gigas* and its allies, the upper lobe projecting and hanging over so as to present, when viewed sideways, a narrow horizontal slit.

HELICARION SOLIDUM, Godwin-Austen, Plate II, Fig. 5.

When this species was first brought to notice by me in the P. Z. S., 1872, Plate XXX, the animal had never been observed. It has the form of *Shillongense*, &c., and a specimen from Kohima was dark amber, pinker below, with no mottling on the body; tentacles dark.

In another specimen from the Dunsirí valley, Assam, the animal was pinkish grey with dark mottling, the mantle covered the whole shell and had a slight indentation on the extreme anterior margin; the mucous gland with small lobe above, the extremity of foot cut off rather square.

Total length 2.70, mantle 1.3, mantle to head 0.5 in.

Shell—major diam. 0.44 in. (fig. 5).

The specimen from this locality may be young, but the shell is so similar in form to *H. solidum*, first observed on the peak of Hengdan, Muni-pur frontier, that I have not separated it.

HELICARION GIGAS, Benson, small var.

I found that typical *gigas*, originally described from Teria Ghat at base of the Khasi Hills, was replaced on the Burrail Range, by the form a drawing of which, together with one of *H. gigas*, I give on Plate III.

Desc.—Animal dark ochre brown with very dark mottlings, particularly distinct upon the margin of the foot.



Shell—major diam. 0·85, minor 0·56 in.

Helicarion gigas was described by Benson as *Vitrina* in J. A. S. B., Vol. V, p. 350.

EXPLANATION OF PLATES.

PLATE II.

- Fig. 1. *Helicarion Shillongense*, var. 1a. Shell of ditto.
 2. „ „ *brunneum*.
 3. „ „ *Nagaense*. 3a. Animal: mantle, side view. 3b. Mantle from above. 3c. Mucous gland.
 4, 4a. *Parmarion ? rubrum*. 4b. Shell of ditto. 4c. Extremity of foot. 4d. Head withdrawn below mantle. 4e. Mantle from above.
 5. *Helicarion solidum*, G-A., shell. 5a. Mantle from above. 5b. Mantle, side view. 5c. Mucous gland. 5d. Extremity of foot.

PLATE III.

1. *Helicarion gigas*, Bs., nat. size.
 2. „ „ small var. „

III.—*Descriptions of New Operculated Landshells belonging to the genera Craspedotropis, Alycaeus, and Diplommantina, from the Nágá Hills and Assam.*—By Major H. H. GODWIN-AUSTEN, F. R. G. S., F. Z. S., &c.

(Received Sept. 1874 ;—Read February 3rd, 1875).

(With Plate IV).

CRASPEDOTROPIS FIMBRIATUS, n. sp., Plate IV, Fig. 1.

Shell conoidly turbinate, closely umbilicated, thin, covered with a rough dark brown epidermis, longitudinally striate, a leaf-like fringe adorns the periphery of the last whorl, spire conoid, its side concave, apex attenuate, blunt, suture deep; whorls 5, flat above, aperture diagonal, circular, the lip slightly reflected, peristome thin. Operculum multispiral, flat, smooth on outer surface. Animal not seen.

Major diam. 0·19, alt. 0·15 in.

Hab.—Hengdan Peak, Naga Hills, at 7,000 ft., in forest.

Only one specimen was obtained. This is a very interesting shell, as being the first of the genus from this part of India; *Craspedotropis*, esta-

published by Mr. W. T. Blanford, having been hitherto only known from the hills of Southern India and represented by *C. cuspidatus*, Bs., the fringe on the keel of which is however hairy. Colonel Beddome has, I believe, discovered one or two other new forms.

ALYCEUS SCULPTURUS, n. sp., Plate IV, Fig. 2.

Shell closely umbilicated, turbinate, horny or grey, with distant well-marked costulation on the upper whorls, smooth below, finely ribbed on swollen part of whorl, still more finely on the constricted portion, spire subconoid; whorls 4, the last slightly swollen, then constricted and slightly swelling again towards the peristome, which is longitudinally undulated; sutural tube moderate, aperture oblique, waved, peristome thickened, expanded a little, double, with four deep undulations on the outer margin and one less developed on the lower, the first undulation forming a deep notch in the peristome near its junction with the last whorl. Operculum as in *A. crispatus*, mihi.

Major diam. 0.14, minor diam. 0.10, alt. 0.08, diam. of aper. 0.06, sutural tube, 0.55 in.

Hab.—Obtained by me on the hill ranges from near Tellizo Peak to the eastward, and on Mungching Hill in Manipur. Abundant.

This species is very close to *A. crispatus*, G-A. from the Khasi and Jaintia Hills (J. A. S. B., Vol. XL, Pl. IV, fig. 1), but is a much more closely wound shell—a character which, when a large series of the two were placed side by side, was found to be constant, and this, with the absence of the ridge on the constriction, marks it as distinct. *A. sculptilis*, Bs., originally described from Burmah, and of which I collected identical specimens in Manipur, is another form near to *sculpturus*, but has no crenulation of the peristome and is plain and ridgeless on the constriction; the three forms pass into one another.

DIPLOMMATINA BURTII, n. sp., Plate IV, Fig. 4.

Shell dextral, tumidly and ovately fusiform, colour pale umber or sienna-brown, very finely and closely costulated under lens, almost smooth to the naked eye, spire rapidly attenuate, apex sharp, suture well impressed below; whorls 8, the three last swollen and rounded, those near apex flat, penultimate the largest, the last rising slightly towards the aperture, which is vertical, broad, and well rounded below, peristome double, very thick, continuous, columellar tooth strong.

Hab.—Base of the Eastern Himalaya, at the debouchement of the Burrowli River, Assam, where it was collected by Mr. J. Burt, after whom I have named it, and who kindly collected some other interesting shells in the same locality.

It is a form of the type *D. diplocheilus*, Bs., but the peculiar attenuate spire and tumid shape below are very distinctive.

*DIPLOMMATINA SHERFAIENSIS*, var., Plate IV, Fig. 5.

A form similar to that from the Peak of Sherfaisip, North Cachar Hills, described in J. A. S. B., Vol. XXXIX, 1870, p. 3, and differing from it only in its much more tumidly fusiform shape and larger size.

Alt. 0·14, diam. 0·09 in.

It was very abundant on the Peak of Japvo at 10,000 ft., and shews an interesting divergence from the form found at the highest elevation of the same range further west. On the Peak of Shiroifur at an equal altitude but 40 miles to the south-east, the form, with the same essential characters, had again changed into a still larger and more solid shell with a more acuminate spire, yet the differences from the original type are not sufficient on which to found a new species.

DIPLOMMATINA TUMIDA, var., Plate IV, Fig. 7.

Shell elongately fusiform, thin, pale yellowish green, sculpture very faint above, quite smooth on the 3 last whorls, spire attenuate, sides flat, suture moderate; whorls $8\frac{1}{2}$ to 9, the antepenultimate the largest, constriction in front, above the aperture, last whorl ascends slightly; aperture oval, vertical, peristome double, thickened, slightly reflected, columellar tooth small and remote.

Alt. 0·22, diam. 0·13 in.

Hab.—Kézákenomih, Nágá Hills. This shell is a better type of this form of *Diplommatina* than the very tumid shell first described from Asalu; the form changes much in different localities, in some being much more solid and more distinctly and distantly sculptured near the apex; a variety from the Eastern Burraill is 0·20" in alt., rich dark amber coloured, has the 3 lower whorls smooth and glassy, the columellar tooth still more remote, and the constriction just behind the peristome; it departs so widely from the original type that it might almost be separated. Accurate drawings of a series of specimens are requisite to shew these gradual changes, and these I hope to be able to give hereafter.

DIPLOMMATINA CONVOLUTA, n. sp., Plate IV, Fig. 8.

Shell dextral, elongately fusiform, solid, pale yellowish or greenish-horny, very finely costulated towards the apex, 2 last whorls smooth, striated near the aperture, spire with rather flattened sides, suture impressed; whorls 8, antepenultimate the largest, the penultimate constricted at $\frac{1}{2}$ turn behind the peristome, the last ascends very sharply, contracting the breadth of the penultimate very considerably; aperture sub-vertical, lying to the right of the axis, peristome circular, solid, double, the tooth small and situated far within the columellar margin, lip scarcely reflected. Animal not seen.

Alt. 0·25, diam. 0·15 in.

Hab.—Slopes of the Eastern Burrail at about 6,000 ft., tolerably abundant.

A very near ally of *D. Jatingana*, G-A, from which it is readily distinguishable by the situation and reduced size of the columellar process, its elongate flat-sided form, and very different sculpture.

EXPLANATION OF PLATE IV.

- Fig. 1. *Craspedotropis fimbriata*. With magnified drawing of the leaf-like fringe.
 „ 2. *Alycaeus sculpturus*.
 „ 3. „ *crispatus* (basal side).
 „ 4. *Diplommatina Burtii*.
 „ 5. „ *Sherfaiensis*, var.
 „ 6. „ *tumida*, type form.
 „ 7. „ „ var.
 „ 8. „ *convoluta*.

IV.—Note on a partially ossified Nasal Septum in *Rhinoceros Sondaicus*.

By O. L. FRASER.

(Received 1874;—Read March 3rd, 1875.)

(With Plate V.)

Whilst cleaning the skull of a *Rhinoceros Sondaicus* lately obtained by me in the Sunderbuns, I was much surprised to find a partially ossified *septum narium*—a structure which I had hitherto looked upon as solely characteristic of the fossil *Rhinoceros* and for any mention of which in a recent species I have looked in vain; indeed Cuvier (*Oss. foss.* Vol. 2, p. 26,) distinctly states that no such thing occurs in the recent ones.

The specimen in question was a female 5 feet 6 in. high and, though a fully adult one (as the size of a foetus she was carrying proved), from the unworn condition of her teeth she certainly was not old, so that the ossification could not be merely the result of age, as is so very often the case with the cartilages and even the tendons of mammals, birds, &c.

On looking at some other skulls, I found in two old specimens (one from Java, and the other the locality of which is unknown) traces of where such a structure might have been but had been destroyed either in cleaning or in some other way. In a third (not so old as the two preceding but still an older one than mine) there is distinct evidence of an exactly similar formation to that I am about to describe, though the anterior bone has been lost and part of the posterior portion broken away; this specimen was also from the Sunderbuns.

In some 6 or 7 skulls of *R. indicus* that I examined there was not the slightest indication of it, the vomer being quite distinct, and there being no roughened articulating surface on the inner side of the nasals.

In the first mentioned ♀ specimen, the septum, commencing from the ethmoid, is ossified for about 3 inches; it then divides, the lower portion running to within $5\frac{1}{2}$ in. of the maxillo-premaxillary articulation and being intimately connected with the vomer, along whose channel it runs, the upper portion forming a fringe about an inch deep along the inner surface of the conjoined nasal bones (to which it is ankylosed) to within $5\frac{1}{4}$ in. of their tip (the curved upper walls of the nasal cartilages being also completely ossified and ankylosed to the inner surface of the nasals and maxillaries for the same distance); here there is a break and the bone is perfectly smooth for a space of 2 inches, when there commences a diamond shaped roughened surface, which occupies the whole of the remaining $3\frac{1}{4}$ in. of the inner side of the nasals, and on this was articulated the ossified termination of the nasal cartilage. This is of subtriangular form and consists of a plate of bone $3\frac{1}{2}$ in. long, about $1\frac{1}{2}$ deep, and $\frac{1}{4}$ thick. Its upper edge is expanded laterally to a width (in its greatest measurement) of $1\frac{1}{2}$ in., and forms a deep sulcus, into which the tip of the nasals and the roughened articular surface of their underside fit. The anterior edge of this bone is slightly in advance of the tip of the nasals and is $1\frac{1}{2}$ in. in advance of the anterior point of the præmaxillæ, between which point and the lower edge of the septal bone there is a distance of one inch.

I have since seen the skulls of two other specimens shot at the same place, the one an adult and the other a younger ♂. This structure was present in both.

As can be seen from the accompanying drawing, it bears a strong resemblance to the figure given by Prof. Owen (in his Hist. of Brit. Foss. Mamm.) of *R. leptorhinus*. There is this difference that in *R. leptorhinus* the ossified terminal portion of the septum is ankylosed to the nasals, whilst in *R. Sondaicus* it is not. This, however, might take place at a more advanced age, as, in a foot-note to p. 367, he mentions that the bony septum of *R. tiorhinus* is free until the animal has quite attained maturity. Judging, however, from the old skulls of *Sondaicus* before mentioned, I should not think that it would do so, or it would still remain *in situ* in those skulls. Again, Prof. Owen speaks of the edges of the septum of *leptorhinus* as being complete, whereas in *sondaicus* they are not. They bear distinct marks of the insertion of the posterior cartilage, thus leading one to think that, even if it did not ankylose to the nasals, it might in a very old animal become a completely ossified septum.

Prof. Owen also (Anat. of Vertebrates, Vol. III, p. 356) regards the cloison in *Rh. tichorinus* as indicative of the great development of the horns in that species, but in *Rh. sondaicus* the horn is small (5 or 6 inches as a rule and never exceeding a foot or 18 inches) in the male, and what is very peculiar, the female has no horn whatever. I do not know of any other

Rhinoceros in which this is the case; as in *Rh. indicus*, as well as the double-horned species with which I am acquainted, the female carries a horn or horns, though they are generally smaller than in the male.

EXPLANATION OF PLATE V.

- Fig. 1. Side view of the skull with the terminal ossification (*) *in situ*.
 „ 2. Section of the skull showing the posterior ossification (**)
 „ 3. Inner or under view of the conjoined nasal bones showing (a) the anterior termination of the upper fringe with the ossified nasal cartilages (b. c.) and (d) the roughened articular surface for the terminal bone.
 „ 4. Front view of the tip of the nasals with the terminal bone *in situ*.
 „ 5. Front view of the bone disconnected.
 „ 6. Upper or articular surface of ditto.

V.—*On the Scientific Names of the Sind "Ibex," the Markhor, and the Indian Antelope.*—By W. T. BLANFORD, F. R. S., F. G. S.

(Received 27th May,—Read June 2nd, 1875.)

In the Proceedings of the Asiatic Society for December last, p. 240, Mr. Hume proposed the names of *Capra Blythi* for the Sind wild goat or ibex, and *Capra Jerdoni* for the Suliman variety of the Markhor. The former animal is only incidentally mentioned in Jerdon's Mammals of India, p. 293, and then it is called *Capra Caucasica*.* The two forms of Markhor inhabiting Kashmir and Afghanistan are mentioned by Jerdon, but very briefly. As the idea is prevalent in India that neither the Sind goat nor the Suliman Markhor are known to naturalists, I think it may be useful to shew that this view is erroneous, and that neither animal requires a new scientific name.

To take the Sind "ibex" first. This animal is, I think, clearly identical with the wild goat of Persia, Armenia and the Caucasus, and probably of Crete. There is another wild caprine animal in the Caucasus, more nearly allied to the Alpine and Central Asian species of ibex, and this animal is the true *Capra Caucasica*. The wild goat of Persia and Sind has long been known throughout the civilized world as the source of the genuine bezoar,† so greatly famed in former times for its supposed virtue as an antidote to poison.

* It should be borne in mind that the Sind goat does not occur east of the river Indus, which was adopted by Dr. Jerdon, in the Prospectus published at the commencement of his "Birds of India," as the western boundary of the Indian fauna.

† This word is Persian, or rather, a corruption of the Persian *pāzahr*, which again is derived from *fd-zahr*, useful or profitable (against) poison.

By many old writers, however, it was supposed that the bezoar was procured from a kind of antelope, and Linnæus confounded the wild goat of Persia, the *Pá-sang* (rock-footed), with the Persian gazelle, the horns of which apparently were described by him as those of his *Capra bezoartica*. The first author who gave a clear account of the bezoar goat was S. G. Gmelin, frequently called the younger Gmelin, who obtained a specimen in the Elburz mountains of Northern Persia close to the southern coast of the Caspian Sea. He, however, erroneously stated that the females have no horns. A head and horns procured by Gmelin were sent to St. Petersburg and carefully described and figured under the name of *Ægagrus* by Pallas in his *Spicilegia Zoologica*, Fasc. xi, pp. 43-49, tab. v, fig. 2, 3, published in 1776. In this paper, which contains a description of *Capra Sibirica* (or as Pallas terms it *Ibex alpium Sibiricarum*), Pallas points out that the *Ægagrus* is the apparent progenitor, in part at least, of the domestic goat, a view which has been generally admitted. Indeed Gmelin in the 13th edition of the *Systema Naturæ* united the tame goat, *Capra hircus*, L., with the *Ægagrus* of Pallas, under the name of *Capra ægagrus*.

Schreber and other writers did little more than adopt the name *Capra ægagrus* and copy Pallas's description and figures, which were repeated with an additional representation of the skull and horn-cores in Pallas's *Zoographia Rosso-Asiatica*. The only difference shewn by these figures from the ordinary horns of the Sind ibex is that, in the head figured by Pallas, the horns are slightly curved towards each other near the tips, which is not the case in most Sind specimens. But any one who has studied ruminants knows that trifling variations of this kind occur, and that the difference is of no importance is shewn by Hutton's remarking* that, out of five pairs of horns in his possession, three were curved towards each other near the tips, and two were not. He also says† that some horns (of *C. ægagrus*) are turned inwards, others outwards, at the extremities. I think there can be no reasonable doubt but that the Sind ibex is identical with *C. ægagrus*.

It is quite unnecessary to enter further into the accounts of the animal in various European works beyond pointing out the confusion which has arisen about its name, and which has doubtless been the cause of its now receiving an additional synonym.

In the first Mammalian Catalogue published by the British Museum, the 'List of the specimens of Mammalia' issued in 1842, the name *Capra ægagrus* does not appear, but certain specimens, which are referred to *Capra Caucasica*, are said to be those described by Col. Hamilton Smith, who was one of the editors of Griffith's translation of Cuvier's 'Animal Kingdom'. The references in the British Museum list under *C. Caucasica* are; first:

* Calcutta Jour. Nat. Hist. II., p. 541.

† Ibid. p. 528.

Güldenstädt, Act. Petrop. 1779, t. 16-17; second: H. Smith, Griffith, A. K. V. 871. The first is the original description of *Capra Caucasica*, an animal differing widely from *C. ægagrus*, and having massive horns not angulate in front. To the second I shall refer immediately.

In the next British Museum Catalogue, that of the *Ungulata Furcipedæ* published in 1852, p. 153, the *Capra Caucasica* of the former catalogue is placed as a synonym under *Hircus ægagrus*, under which name both the *ægagrus* of Pallas and the tame goat, *Capra hircus* of Linnæus, are included, as they were by Gmelin, and again reference is made to Col. Hamilton Smith's description in Griffith's Animal Kingdom. It thus appears that Dr. Gray, the author of both British Museum catalogues, attributes the mistake about the name to Col. Hamilton Smith. But on turning to Griffith's Animal Kingdom, V, p. 357, I find No. 870, *Capra Caucasica* described as having "the horns triangular, the anterior edge obtuse, irregularly marked with transverse knots and uniform wrinkles," while *C. ægagrus* is quite correctly said to have the "horns forming an acute angle to the front, rounded at the back, transversely ribbed, forming an undulating anterior edge." It appears to me that the species were correctly discriminated by the older writer, and that the mistake of confounding them is Dr. Gray's.

Dr. Adams obtained the name *C. Caucasica* from the British Museum, and thus misled Jerdon, who, it may be seen, mentions in his Mammals, p. 292, that *Capra ægagrus* is found in Persia and other parts of Central and Western Asia; whilst on Adams's authority, though evidently with some doubt, he refers the wild goat of Sind and Baluchistan to *C. Caucasica*.

The synonymy given below will shew the confusion which has existed at the British Museum as to the name of this species. It figures by turns as *Capra Caucasica*, *C. hircus*, *Hircus ægagrus*, and if I am not mistaken *Hircus gazella*. Part of this confusion is I think due to the circumstance that Dr. Gray apparently looked upon the horns of *C. ægagrus* as those of a tame or feral race, and consequently united them with various tame goats. I have shewn that the wild *C. ægagrus* was united to the tame *C. hircus* by Gmelin, and the same author apparently mixed up half a dozen animals, one of which was the bezoar goat of Persia, in his *Antilope gazella*.*

Indian naturalists of a former generation were better acquainted with the wild goat of Western Asia than Dr. Gray appears to have been. The first mention that I can find of the existence of *Capra ægagrus* in the neighbourhood of India is in a paper by Captain Hutton published in the Calcutta Journal of Natural History for 1842, where the animal is correctly named, and an excellent description given of its colour at different seasons, its appearance and habits. The accompanying figure is not good. Captain

* *Capra gazella* of Linnæus is, I believe, the Cape Oryx.

Hutton also relates the success of some experiments made by him as to the effect of crossing the wild *Capra ægagrus* with tame goats, but he is disinclined to believe that the former is really identical in species with the latter. In Hutton's 'Rough notes on the Mammals of Candahar' in the Journal of the Society for 1846, he only refers to his previous description, and mentions the final result of his experiments in breeding between *C. ægagrus* and tame goats. The same animal apparently was obtained by Sir A. Burnes in Cabool, and was described by Dr. Lord in Appendix V to Burnes's work on that country, p. 386. He speaks of it as the Markhor-Pazuhu; the (latter word being perhaps a corruption of Pásang,) and notices that it is probably *Capra ægagrus*. A pair of horns obtained by Sir A. Burnes and named *C. ægagrus* by Blyth is in the Asiatic Society's collection, now the Indian Museum.

The following synonymy will enable any one to examine the history of the animal more fully: other references might be given, but the greater portion of them will be found quoted by the authors named. A most elaborate account of the habits of this animal in the Caucasus is given by Kotschy (l. c.).

CAPRA ÆGAGRUS.—The Pásang or Persian wild goat.

S. G. Gmelin, Reise. III., p. 493.

Ægagrus, Pallas, Spic. Zool. Fasc. XI, p. 43, Tab. V. fig. 2, 3, (1776).

Caucasan, Pennant, hist. quad. No. 14, p. 51.

Antilope gazella, Gmel., Syst. Nat. I, p. 190, *partim*, nec *Capra gazella*, L.

Capra ægagrus, Gmel., Syst. Nat. I, p. 193, *partim*.

Ægoceros ægagrus, Pall. Zool. Ros. As. I, p. 226, Tab. XVI, fig. 3, 4, 5.

Capra ægagrus, Schreb. Säugth. V, p. 1266, Pl. CCLXXXII.

Ægoceros ægagrus, Wagner, in Schreb. Säugth. V, 1, p. 1315.—Ib. Suppl. Pt. IV, p. 502.

Markhor-Pazuhu, Burnes, Cabool, p. 386, (1842).

Capra ægagrus, Hutton, Calcutta Jour. Nat. Hist. 1842, II, p. 521, Pl. XIX, (a poor figure of the whole animal).—J. A. S. B., XV, p. 161.

Capra Caucasica, Gray, List. Mam. Brit. Mus. (1843) p. 167.—Adams P. Z. S. 1858, p. 525; Wanderings of a naturalist, p. 36.

Hircus ægagrus, Gray, Cat. Ungulata Furcipedæ Brit. Mus. (1852), p. 153, *partim*.—Cat. Rum. Mam. (1872), p. 53, *partim*.

Capra hircus, Gray, Cat. Ungulata Furc. Pl. XX, fig. 1, 2, (horns).

Capra ægagrus, Kotschy, Verh. Zool. Bot. Ver. Wien, IV, 1854, p. 201.—Blasius, Säugth. Deutschl. p. 485, fig. 264, (skull and horns).

? *Hircus gazella*, Gray, Cat. Rum. Mam. p. 53, *partim*.

Capra ægagrus, Blyth, Cat. Mam. Mus. As. Soc., p. 176. No. 544, (1863).

Capra Blythi, Hume, Proc. As. Soc. 1874, p. 240.

Pásang, male, *Boz*, female, Persian; *Borz*, Afghan; *Ter* (male) and *Sera*, Sindhi; *Phashin*, Baluchi.

I now turn to the Markhor. The first description of this animal was given by Wagner, under the name of *Ægoceros (Capra) Falconeri*, Hügel, and I may here remark that this name, given in honour of one of the most eminent of Indian naturalists, must be adopted for this wild goat, as it has priority by 3 years over Hutton's name *Capra megaceros*; Wagner's description having appeared in 1839 in the 'Gelehrte Anzeigen' of Munich. The skin and horns described were obtained by Freiherr v. Hügel from Kashmir. The animal was figured and again described in Wagner's appendix to Hügel's Kashmir, and both figure and description were repeated in the supplement to Schreber's Säugethiere by the same author. The references are given at full in the synonymy below. The horns of the typical specimen have an unusually open spiral curve.*

Captain Hutton in 1842, described the 'Markhore' or the 'Snake-eater' of the Afghans, under the name of *Capra megaceros*, in the Calcutta Journal of Natural History, and gave a figure of the skull and horns. The form here figured is the Afghan variety, in which the spiral is so slight that the horns approach a straight line. This is the race for which Mr. Hume has proposed the name of *C. Jerdoni*,† but it is clear that if this animal be considered specifically distinct from the Kashmir *C. Falconeri*, Hutton's name must be retained for it. The same name *C. megaceros* was subsequently given by Cunningham in 1854, (Ladak p. 200), to the Kashmir form, but the author was under the impression that the animal was undescribed, and was unacquainted with either Hügel's or Hutton's name.

The most important question, however, is whether the Kashmir and Suliman forms of the Markhor are specifically distinct. At first it appears difficult to believe that animals belonging to the same species have in some instances horns with the open spiral of a corkscrew, and in others straight horns with only a deep spiral groove. As Mr. Blyth justly says‡, the horns vary in curve as much as those of the Koodoo do from those of the Impofo (or Eland). But on the other hand it should be remembered not only that both forms of horns have long been perfectly well known to naturalists, but

* So different are these horns from those of most Markhor, that some naturalists have supposed them to have been obtained from a tame goat. But as has been shewn by Blyth, the spiral in tame goats is always reversed, the anterior ridge just above the forehead turning inwards or towards the other horn at first. In the Markhor this ridge turns outwards. Judged by this test Wagner's figure represents a wild Markhor and not a game goat. I have never myself seen Markhor horns with so open a spiral as those of Hügel's type of *C. Falconeri*.

† It is probable that Mr. Hume's specimens may have been less spiral in form than Hutton's type, for the former are described as resembling an ordinary screw. But as I shall shew, the precise form of the horns varies greatly.

‡ P. Z. S. 1840, p. 80.



that there are large numbers of them in Europe. Blyth, who was certainly not disposed to unite distinguishable forms, was well acquainted with both races, so were Gray, Jerdon, and Adams, yet every one of these naturalists looked upon the different forms of horn as of no specific importance, no other difference having been shewn to exist in the animal, and the form of the horns varying in each locality. There was a living male from near Peshawar recently (and there may be still) in the gardens of the Zoological Society of London with very straight horns, differing, if my recollection is correct, from the type of *C. megaceros* of Hutton, almost as much as this does from the Kashmir race, and on a photograph published by Mr. E. Ward, four distinct forms of Markhor horns are represented. Hutton in his original description of *C. megaceros* says, "They (the horns) are spirally twisted but differ much in the closeness of the volutions, some turning round a straight and direct axis from the base to the apex, others taking a wider or more circular sweep." Indeed so notorious is the fact that these horns vary in curvature, that Blyth for a long time looked upon the animal as a feral race of tame goat and not a truly wild animal*, and Vigne, who met with the Markhor both in Afghánistán and Káshmir, and who noticed the difference in the horns, pointed out that no other distinction existed in the animal.

As in the case of *Capra ægagrus* I give the synonymy below. In this I do not separate the two forms, because, so far as I am aware, no sufficient evidence has yet been adduced to shew that they deserve separation. But should such evidence hereafter be brought forward, I may repeat that the name *Capra Falconeri* will stand for the Kashmir form with openly spiral horns, and that of *C. megaceros* for the Suliman race with the horns more nearly approaching a straight line; it being remembered that much variation exists in both cases.

CAPRA FALCONERI.—*The Markhor.*

Markhor goat, Vigne, Personal Narrative of a visit to Ghuzni, Cabul, &c. p. 86, and vignette, p. 67.—Travels in Kashmir, &c., II., p. 279.

Ægoceros (Capra) Falconeri, Hügel: Wagner, Münch. Gel. Anz. IX, p. 430 (1839).

Markbur, Blyth P. Z. S. 1840, p. 80.—Ann. and Mag. Nat. Hist. VII. 1841, p. 196, note.

? *Rass*, Wood, Journey to source of the Oxus, p. 369 (1841).

Markhor, Burnes, Cabool, p. 387 (1842).

Capra megaceros, Hutton, Calcutta Jour. Nat. Hist. II, p. 535, Pl. XX, (horns), (1842). J. A. S. B., XV., p. 161.

Capra Falconeri, Hügel; Wagner, Beiträge zur Säugeth. Faun. in Hügel's Kaschmir, p. 579, (with a lithograph of the animal), (1844).

Ægoceros Falconeri, Wagner, Schreber's Säugethiere, Suppl. IV, p. 499, Tab. CCLXXXVII E,—Ib. V, p. 466.

* P. Z. S. 1840, p. 80.



Hircus agagrus, var. 1. Gray, Cat. Ung. Fure. B. M. (1852), p. 159.

Capra megaceros, Rapho-che, (Markhor) or large wild goat. Cunningham's Ladák, p. 199, Pl. 17, (1854).

Hircus megaceros, Adams, P. Z. S., 1858, p. 525.

Capra megaceros, Blyth, Cat. Mam. Mus. A. S., p. 176 (1863).—Jerdon, Mammals of India, p. 291 (1867).

Hircus Falconeri, Gray, Cat. Rum. Mam. B. M. 1872, p. 53.

Capra Jerdoni, Hume, Proc. A. S. B. 1874, p. 240.

Markhor, Afghan: *Ra-che*, (Rawa-che and Rapho-che ♂ and ♀), Ladák.

I have already referred to the *Capra bezoartica* of Linnæus. This was founded on the various accounts of the bezoar goat given by older writers, amongst whom was Aldrovandi. Blyth has derived the specific name *bezoartica*, which he adopts* for the common Indian antelope, from Aldrovandi, and Jerdon† has followed Blyth in this as in most questions of mammalian nomenclature, so that in both lists this animal stands as *Antelope bezoartica*, Aldrovandi.

Now there is no rule more generally admitted, amongst English zoologists at least, than that specific names given before the publication of the 12th edition of Linnæus's *Systema Naturæ* in 1766 are invalid.‡ Aldrovandi§ dates from 1621.

* Cat. Mam. Mus. As. Soc. p. 171, No. 528.

† Mam. Ind. p. 275, No. 228.

‡ Unless there is agreement amongst naturalists as to the adoption of rules for nomenclature, it is evident that the sole object of a scientific terminology, that all people of whatever race, despite difference of language, should employ the same term for the same animal, plant, mineral, &c., would not be gained. Any one would suppose that this is a self-evident proposition and that it is to the advantage of all naturalists to agree to fixed rules of nomenclature, but, strange to say, it is incredibly difficult to induce many to consent to any rules. So long as the absurd idea exists that species and genus-makers have rights which require protection, so long will anarchy prevail. The law of priority is established for general convenience and to enforce a fixed nomenclature, not to commemorate the makers of species.

The rules drawn up by a Committee of the British Association in 1842 (Rept. Brit. As. 1842, p. 106) and approved, with slight alterations, by another Committee of the same body in 1865 (Rept. B. As. 1865, p. 25) are the fairest yet proposed for regulating scientific nomenclature, and they should be adopted until other rules are established by general consent. To many naturalists in India these rules do not appear to be known, and I may therefore be excused for referring to them. The rules of Linnæus are republished at the commencement of the "Nomenclator Zoologicus" of Agassiz, but so many of them have been broken habitually for years, that they have become obsolete. Had they been enforced, zoological nomenclature would never have become the chaos it now is, and much advantage would I think be gained if they were better known than they are, and their general spirit at least adopted.

§ Aldrovandi, Quæd. Bis. p. 256, under *Capra bezoartica*, gives a figure probably meant for the Indian antelope, but in the text he describes several species, one of them



The *Capra bezoartica* of Linnæus is thus described "*Capra bezoartica cornibus teretibus arcuatis totis annulatis, gula barbata.*" The bearded chin, and the description of the animal's habits refer, I think, to the bezoar goat of Persia, *Capra ægagrus*, whilst the round *arcuate* horns are probably those of a Gazelle, and very possibly those of *Gazella subgutturosa*, the species found in Persia. The description cannot possibly be made to agree with the Indian antelope.

The first description of the Indian antelope published after the appearance of the 12th edition of Linnæus is that of Pallas, whose first fasciculus of the *Spicilegia Zoologica*, published in 1767, contains a monograph of the genus *Antilope*. The Indian antelope is there described as *A. cervicapra*, p. 18, No. 16, and figured in Tab. I. and II. The *bezoartica* of the same monograph No. II., p. 14, is apparently an oryx.

Gmelin, Schreber, Wagner, and almost all continental writers have adopted Pallas's name for the species, and it has undoubted priority over all others. The same name appears to have been used by most English writers until lately. Error in this case, as in that of *Capra ægagrus*, is to be traced apparently to the British Museum Catalogues,* in which the species was named *Cervicapra bezoartica* upon a well known principle, which although admissible, is extremely objectionable, that of converting the specific name into a generic term and coining a new specific term. This was in the catalogue of 1843, in which the only species retained under the genus *Antilope* was *A. melampus*. In both the subsequent catalogues, those of 1852 and 1872, the Indian antelope is made the sole member of the genus *Antilope*, Sundevall's genus *Æpyceros* being employed for *A. melampus*, but instead of restoring Pallas's specific name, Dr. Gray has in violation of all rule retained his own (or Aldrovandi's) most objectionable appellation *bezoartica*. It is a question whether this name should be preserved at all, in the first place it is misleading, as the Indian antelope is not the bezoar goat, and in the second place it leads to confusion because the animal is not the *Capra bezoartica* of Linnæus; but if the antelope be placed in the genus *Antilope*, there can be no question that its proper name is *A. cervicapra*.

There remains, however, one question to be decided, and that is, whether *A. cervicapra* is correctly made the type of the genus *Antilope*. This genus was not employed by Linnæus, who placed the species of antelope known to him, with the goats, under *Capra*. The modern genus must therefore be derived from Pallas, who, as already mentioned, published a

probably the wild goat of Persia. It is evident that he meant to give the name to the animal from which bezoar was obtained, and he figured the Indian antelope under the mistaken idea that it was the real bezoar-producing animal.

* List Sp. Mam. B. M., 1843, p. 159.—Cat. Mam. Ungulata Furcipedes, 1852, p. 66.—Cat. Rum. Mam. 1872, p. 40.

monograph of *Antelope* in 1767, (Spic. Zool. No. I.) This monograph includes 16 species, the last of which is *A. cervicapra*.

The old Linnæan rule is that when a genus is divided, the majority of the species shall be retained under the old generic name, and a new name be given to the smaller section. There is another rule adopted by some naturalists, viz., to keep the generic name for the species first placed in the list by the original author of the genus. This last rule has led to absurdities, and, as Dr. Günther has shewn, it would render the common crocodile the type of the genus *Lacerta*. Practically it has been usual to allow any one dividing one of the old genera into several to retain the original name for whichever section he thought best, and the old generic name has usually been preserved for the best known species and its affines.

The first naturalist who divided the old genus *Antelope* was Blainville,* who in 1816 broke it up into 9 generic groups. In the first of these, *Antelope*, he retained 3 species, *A. cervicapra*, *A. saiga*, and *A. gutturosa*. The next author who divided the genus, Hamilton Smith, retained the same species with some additions, but this is of small importance. Blainville also established a genus *Cervicapra* containing a very miscellaneous collection of species; *A. dama*, *A. redunca*, *A. orcotragus*, *A. saltiana*, *A. sumatrensis*, *A. quadricornis*, and several others.

Of the three species left in the genus *Antelope* by Blainville, *A. saiga* was made into a distinct genus by Gray in 1843, and *A. gutturosa* appears to belong to *Gazella* and not to restricted *Antelope*. It is placed in *Gazella* by Sundevall and Sir V. Brooke, whilst Gray in his later catalogues associates it with *Procapra picticauda* of Hodgson, a form which must I think also be referred to the gazelles. The sole remaining representative of the genus *Antelope* is consequently the Indian antelope, which cannot be assigned to the genus *Cervicapra*, because it was not placed in that genus by Blainville, who first used the name, nor is it congeneric with any of the species assigned to *Cervicapra* by Blainville. Gray's genus *Cervicapra* falls to the ground, because if the name be used at all, it can only be employed for Blainville's genus or part of Blainville's genus. On all grounds, therefore, it appears that the correct generic and specific name of the Indian antelope is *Antelope cervicapra*.

* Bul. Soc. Phil. 1816, p. 74. I have not access to this work and quote from Wagner and Fitzinger.

VI.—*On some recent Evidence of the Variation of the Sun's Heat.*—By
HENRY F. BLANFORD, *Meteorologist to the Government of India.*

(Received June 1st ;—Read June 2nd, 1875.)

Since the British Association meeting at Brighton in 1872, at which Mr. Meldrum brought to notice the fact that the Cyclones of the Indian ocean vary in frequency with the period of sun-spot frequency, several attempts have been made to trace out the evidence of a similar periodicity in other meteorological phenomena. Mr. Meldrum and Mr. Norman Lockyer have done this in the case of the rainfall, with the result of shewing that in the Mauritius, Australia, South Africa and some other parts of the world such a variation is to be detected more or less distinctly in the registers. And Professor Köppen has arrived at a similar conclusion in the case of air temperature, a result on which I shall have again to offer some remarks in the sequel. All these results point to the conclusion that the radiation of the sun is not appreciably constant from year to year,* but varies with the appearance and physical state of his surface.

Long prior to any of these discoveries, the possible variation of the sun's heat and of its influence on the earth had been the subject of speculation among solar physicists. According to Professor Wolf, (as quoted by Professor Köppen,) Riccioli, in 1651, shortly after the first discovery of sun-spots, surmised that some coincidence might exist between them and terrestrial weather changes. Sir William Herschell endeavoured to establish such a connexion by discussing one of their remote effects, *viz.*, the rise and fall in the price of wheat in past years. Sabine established a connexion between the solar-spot period and that of magnetic storms; Fritz between the former and the frequency of auroras; and finally, in 1867, Mr. Joseph Baxendell of Manchester succeeded in tracing out a distinct and very striking relation between the number of the sun spots, and the ratio that exists between the difference of the mean maximum temperature of solar radiation and the mean maximum air temperature on the one hand, and that of the mean temperatures of the air and of evaporation on the other.

All these investigations, it will be noticed, have dealt with the problem in an indirect form: that of Mr. Baxendell being, however, the most direct, and perhaps as direct as the data at his command (six years observations of the Radcliffe observatory, and five years of Mr. Mackereth's register at Eccles near Manchester) would admit of. The causes that interfere with the direct transmission of the sun's heat to the earth's surface are so powerful and at the same time so variable, that even with more perfect instruments than

* As was assumed by Mr. Meech in his elaborate treatise on Solar heat in the IXth Volume of the "Smithsonian Contributions to Knowledge."

we possess at present, it is not to be expected that in English latitudes and under her variable and cloudy skies, the temperature of the solar heat incident on the earth's surface, recorded at two stations only, should coincide at all distinctly in variation with that of the heat emitted from the sun. Still, by a very ingenious treatment of the data, Mr. Baxendell succeeded in shewing, with great probability, that the sun's radiation varied in intensity directly with the observed number of the spots during the years 1859 to 1866.

It was still desirable, however, that further and more direct proof should be obtained, and it is obvious that for such a purpose, no country offers more favourable conditions than India; and fortunately, owing in no small degree to the urgent representations of this Society in past years, the means provided by the Government of Bengal, in the establishment of systematic observations throughout its provinces, have put it in my power to bring before the Society this evening, evidence, which if not absolutely conclusive, at least leaves, I think, but little room for doubt, that the old speculations are true; and that the sun's heat varies from year to year, to such an extent as must appreciably affect terrestrial phenomena.

Registers of the readings of a maximum thermometer, the bulb of which* is coated with lamp-black and which is enclosed in an exhausted tube,* were commenced at a few stations in Bengal in the latter part of 1867 or the beginning of 1868; at others the observations were begun in subsequent years. The instruments are freely exposed to the sun's rays, supported on forked sticks at a height of one foot above the ground† and their readings have been recorded on all days, whether clear or cloudy. Being very fragile, and exposed without protection, they are unfortunately very subject to breakage, and although therefore their registers extend in most cases over a period of six or seven years, I can find but one station on my list at which the register has been kept continuously for more than five years with one and the same instrument. This fact very much reduces the quantity of data available for discussion. It appears that, from some cause at present unexplained, these thermometers, made by the best London makers, sometimes differ in their readings to the extent of several degrees (I have known differences of 10° and 15°) when exposed under apparently identical circumstances; and there have been hitherto no means of comparing them together in Calcutta in the only effectual way, *viz.*, by exposing them side by side to the solar radiation, and correcting all to some one instrument, arbitrarily selected as a standard. In dealing with the registers then, I

* In one of these tubes which I opened, (that of a thermometer by Messrs. Negretti and Zambra,) I found the residual air to have a pressure at the freezing point of 1.26 ins. about equal to a vacuum of $\frac{1}{2}$ in.

† At Roorkee the instrument is about 4 feet above the ground.

have been obliged to restrict my comparison to those of consecutive years that have been recorded with the same instrument, and wherever an instrument has lasted over a single twelvemonth only or less, its register has been totally set aside.

The next precaution necessary is to eliminate as far as possible from the individual registers, those irregularities which are due to variations in the state of the sky. This, however, can be done but very imperfectly, otherwise than on the mean of a very large number of observations. It results from the actinometric observations of Pouillet, Kämtz, Quetelet and Althaus, that with a vertical sun, and a sky free from all visible cloud or haze, the proportion of solar heat that penetrates the whole thickness of the atmosphere, and is therefore effective at sea-level, does not amount to more than two-thirds or at the utmost three-fourths of that which reaches the exterior of our atmosphere. Herschell estimates it at the former quantity. But in India, the atmosphere, when cloudless to the eye, is by no means so diathermanous as is here assumed. Sometimes for many days together, with settled weather and a cloudless sky, the sun thermometer gives steady maximum readings, not differing more than one or two degrees. A day follows on which there is a good deal of cloud, and perhaps some rain, and the diathermancy of the atmosphere is so increased in the intervals of the clouds, that the sun-thermometer registers 10° or 15° above any of its previous readings. Such cases occur frequently in all the registers. It is probable therefore that on days registered as cloudless, not less than half the solar radiation and frequently much more is absorbed by the atmosphere. In order to obtain data that shall be fairly comparable, I have in most cases selected those days on which the sky was either cloudless at 10 A. M. and 4 P. M., or had on the average not more than one-fifth of cloud. In the case of the two comparatively cloudy stations Silchar and Port Blair, I have been obliged to extend these limits; in the former case to three tenths, in the latter to one-half. The monsoon months, June to September, are omitted in these tables.

Another method of proceeding which I have adopted in order to verify these results is to take the two highest readings recorded in each month (including the monsoon months) as the data for comparison.

The four following tables give the results. In Tables I. and II. the comparison is restricted to the registers of those stations and years in which the same instrument has been read continuously for at least two consecutive calendar years. The differences of each pair of years are given separately for each station, and the means of the whole. This method of comparison, however, admits of a very small portion only of the data being utilized, since it excludes all broken years, and therefore in Tables III. and IV. I have adopted a modified course of proceeding, which admits these.

I have taken first for each station separately the temperature differences of each pair of homonymous months in consecutive years, rejecting as before all those in which the instrument has been changed in the interval; and next the mean of all the differences thus obtained for the same pair of months. A rise of temperature is indicated by +, a fall by —.

TABLE I.—*Differences of annual means of black-bulb temperatures with a clear sky (as above defined).*

STATIONS.	1868-9	1869-70	1870-1	1871-2	1872-3	1873-4
Port Blair,		+ 2.2				— 1.7
Cuttack,				+ 1.8	+ 1.4	0
Chittagong,				— 0.8	— 1.9	0
Dacca,				+ 2.6	— 2.2	— 0.4
Hazaribagh,	+ 2.9	+ 1.9				— 4.4
Berhampore,						— 2.4
Patna,	+ 7.7					
Monghyr,		+ 2.9	— 0.1			
Silchar,			— 2.1	0	— 1.8	+ 6.3
Roorkee,			+ 2.3			— 5.6
Sums,	+ 10.6	+ 7.0	+ 0.1	+ 3.6	— 4.5	— 8.2
Means,	+ 5.3	+ 2.3	0	+ 0.9	— 1.1	— 1.0

TABLE II.—*Differences of annual means of two highest black bulb temperatures monthly.*

STATIONS.	1868-9	1869-70	1870-1	1871-2	1872-3	1873-4
Port Blair,		+ 2.9				— 1.3
Cuttack,				+ 2.6	+ 2.5	— 2.3
Chittagong,				— 1.7	— 0.4	+ 1.3
Dacca,				+ 1.7	— 1.2	+ 1.2
Hazaribagh,	+ 2.8	+ 3.7				— 3.9
Berhampore,						— 1.2
Patna,	+ 6.0					
Monghyr,		+ 0.3	— 1.0			
Silchar,			+ 1.8	— 2.3	— 0.3	+ 7.7
Roorkee,			— 0.9			— 3.9
Sums,	+ 8.8	+ 6.9	— 0.1	+ 0.3	+ 0.6	— 2.4
Means,	+ 4.4	+ 2.3	0	+ 0.1	+ 0.1	— 0.3

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TABLE III. A.—Differences of monthly means of black-bulb temperatures with clear sky.

JANUARY.

STATIONS.	1868-9	1869-70	1870-1	1871-2	1872-3	1873-4
Port Blair,		— 1·3	+ 3·3			— 8·2
Cuttack,				— 5·0	+ 8·3	— 0·6
Chittagong,				— 2·5	— 3·0	— 1·5
Jessore,	+ 1·7					
Dacca,				— 1·0	— 2·6	— 3·2
Hazaribagh,	— 3·5	+ 5·9	— 1·0			— 5·5
Berhampore,		— 2·9		— 3·4		— 11·8
Silchar,			+ 2·3	— 5·1	— 1·0	0
Monghyr,		+ 1·5	+ 3·8	— 4·7		
Patna,	+ 6·7	+ 8·6				
Roorkee,			— 3·1	— 5·2		— 12·0
Means,	+ 1·6	+ 2·4	+ 1·3	— 3·8	+ 0·4	— 5·3

FEBRUARY.

Port Blair,		— 2·7	+ 4·9			— 2·5
Cuttack,				— 5·0	+ 7·2	— 1·4
Chittagong,				— 4·7	— 0·7	+ 0·5
Jessore,	+ 1·6					
Dacca,				— 1·7	— 0·5	— 3·3
Hazaribagh,	+ 2·2	+ 2·5	+ 3·9			— 0·8
Berhampore,		— 4·2		— 5·1		— 11·3
Silchar,			+ 0·5	— 5·1	+ 2·4	0
Monghyr,		+ 3·2	+ 1·5	— 4·8		
Patna,	+ 20·2	— 3·4				
Roorkee,			— 6·8	— 0·2		— 9·7
Means,	+ 8·0	— 0·9	+ 0·8	— 3·8	+ 2·1	— 3·6

MARCH.

Port Blair,		+ 5·4	+ 2·8			— 7·1
Cuttack,				— 4·8	+ 4·0	+ 0·2
Chittagong,				+ 0·5	— 0·4	— 1·5
Jessore,	+ 2·7					
Dacca,				+ 4·3	— 2·1	+ 0·2
Hazaribagh,	+ 5·0	— 2·3	+ 8·2		— 3·4	— 4·7
Berhampore,		+ 1·6		— 3·1		+ 13·1
Silchar,			— 1·5	— 1·9	— 1·4	+ 1·9
Monghyr,		— 0·4	+ 3·6	— 1·5		
Patna,	+ 19·2					
Roorkee,			+ 0·9	— 9·3		— 15·3
Means,	+ 9·0	+ 1·1	+ 2·8	— 2·3	— 0·7	— 1·7



APRIL.

STATIONS.	1868-9	1869-70	1870-1	1871-2	1872-3	1873-4
Port Blair,		+ 3·8	— 3·2			+ 1·0
Cuttack,			— 0·6	+ 2·7	— 3·9	+ 2·3
Chittagong,			— 0·2	+ 1·8	— 2·0	— 1·7
Jessore,	+ 4·2					
Dacca,			— 4·0	+ 5·1	— 2·9	0
Hazaribagh,	+ 10·0	— 2·1	+ 1·7		— 6·3	— 6·2
Berhampore,		+ 3·6		— 7·3		+ 5·7
Silchar,			— 3·5	+ 1·4	— 6·0	+ 5·3
Monghyr,		— 0·3	+ 1·9	— 2·5		
Patna,	+ 8·4					
Roorkee,			+ 6·1		+ 5·6	— 8·1
Means,	+ 7·5	+ 1·1	— 0·2	+ 0·2	— 2·6	— 0·2

MAY.

Port Blair,		— 0·7	— 3·9			— 7·7
Cuttack,			— 5·9	+ 9·7	— 5·5	— 1·9
Chittagong,			+ 3·7	— 5·6	— 1·8	— 0·2
Jessore,			— 6·7	+ 5·4	— 3·7	+ 0·1
Dacca,	+ 14·2	— 6·6	+ 2·6		— 2·6	— 4·4
Hazaribagh,		+ 9·9			+ 5·0	— 7·2
Berhampore,			— 1·9	+ 1·0	— 3·2	+ 5·9
Silchar,		+ 1·7	— 4·6			
Monghyr,	+ 3·9					
Patna,			— 1·1		+ 6·7	— 4·9
Roorkee,						
Means,	+ 9·1	+ 1·1	— 2·2	+ 2·6	— 0·7	— 2·5

OCTOBER.

Port Blair,	— 1·7	— 8·0			— 8·8	+ 4·0
Cuttack,			— 3·8	+ 4·0	+ 0·2	+ 2·5
Chittagong,			— 5·5	+ 4·1	— 4·3	+ 2·4
Jessore,		+ 6·0				
Dacca,			— 0·6	+ 2·5	— 2·3	+ 4·7
Hazaribagh,	— 7·0	+ 10·6			— 6·9	— 4·1
Berhampore,			+ 0·3		— 12·7	— 1·9
Silchar,			— 4·0	+ 4·6	— 1·3	+ 6·4
Monghyr,	— 4·4	+ 9·0	— 2·9			
Patna,	— 5·0					
Roorkee,			+ 4·6		— 1·3	+ 3·8
Means,	— 4·5	+ 8·4	— 1·7	+ 4·0	— 4·7	+ 2·7

NOVEMBER.

STATIONS.	1868-9.	1869-70.	1870-1.	1871-2.	1872-3.	1873-4.
Port Blair,	- 6.4	+ 0.8			- 2.1	+ 2.1
Cuttack,			- 0.5	+ 4.6	+ 1.2	- 1.8
Chittagong,			- 2.3	- 0.5	- 1.8	+ 3.1
Jessore,		+ 5.7				
Dacca,			+ 0.1	+ 4.6	- 1.9	- 0.8
Hazaribagh,	- 1.2	+ 4.8			- 3.6	- 7.9
Berhampore,	- 0.5		+ 1.9		- 13.4	- 4.3
Silchar,			- 5.9	+ 5.4	- 4.0	+ 15.4
Monghyr,	- 2.8	+ 3.9	- 0.8			
Patna,	- 0.3					
Roorkee,		- 9.6	+ 3.1		- 3.5	+ 0.3
Means,	- 2.2	+ 1.3	- 0.6	+ 3.5	- 3.6	+ 0.8

DECEMBER.

Port Blair,	- 1.7	+ 4.8			- 4.8	+ 4.6
Cuttack,			- 2.5	+ 6.2	+ 1.7	- 1.4
Chittagong,			- 2.6	+ 0.3	- 0.7	- 1.4
Jessore,		+ 2.8				
Dacca,			+ 0.2	+ 2.0	- 2.3	- 0.4
Hazaribagh,	+ 3.4	+ 2.1			- 0.4	- 5.7
Berhampore,	- 4.8		- 0.7		- 10.9	- 5.1
Silchar,			- 3.4	+ 0.2	- 0.3	+ 15.5
Monghyr,	+ 0.5	+ 4.3	- 3.5			
Patna,	+ 8.5					
Roorkee,		- 2.6	+ 1.3		- 5.3	+ 1.3
Means,	+ 1.2	+ 2.3	- 1.6	+ 2.2	- 2.9	+ 0.9

TABLE III. B.—Mean monthly and annual differences of black-bulb temperatures with a clear sky.

MONTHS.	1868-9.	1869-70.	1870-1.	1871-2.	1872-3.	1873-4.
January,	+ 1.6	+ 2.4	+ 1.3	- 3.8	+ 0.4	- 5.3
February,	+ 8.0	- 0.9	+ 0.8	- 3.8	+ 2.1	- 3.6
March,	+ 9.0	+ 1.1	+ 2.8	- 2.3	- 0.7	- 1.7
April,	+ 7.5	+ 1.1	- 0.2	+ 0.2	- 2.6	- 0.2
May,	+ 9.1	+ 1.1	- 2.2	+ 2.6	- 0.7	- 2.6
October,	- 4.5	+ 8.4	- 1.7	+ 4.0	- 4.7	+ 2.7
November,	- 2.2	+ 1.3	- 0.6	+ 3.5	- 3.6	+ 0.8
December,	+ 1.2	+ 2.3	- 1.6	+ 2.2	- 2.9	+ 0.9
Sums,	+ 29.7	+ 16.8	- 1.4	+ 2.6	- 12.7	- 8.9
Means,	+ 3.7	+ 2.1	- 0.2	+ 0.3	- 1.6	- 1.1

TABLE IV. A.—*Differences of monthly means of two highest black-bulb temperatures in consecutive years.*

JANUARY.

STATIONS.	1868-9	1869-70	1870-1	1871-2	1872-3	1873-4
Port Blair,		0	— 1.0			— 13.0
Cuttack,				— 3.5	+ 7.8	— 0.1
Chittagong,				— 2.0	— 1.3	+ 1.4
Jessore,	+ 1.0					
Dacca,				+ 0.6	— 0.9	— 4.7
Hazaribagh,	— 3.0	+ 9.0	— 2.5			— 4.0
Berhampore,		— 5.7		— 3.2		— 8.5
Silchar,			— 3.0	— 3.0	+ 4.5	+ 1.0
Monghyr,		+ 2.5	— 2.0	— 1.0		
Patna,	+ 17.0	— 7.0				
Roorkee,			+ 2.0	— 4.0		— 10.1
Sums,	+ 15.0	— 1.2	— 6.5	— 16.1	+ 10.1	— 38.0
Means,	+ 5.0	— 0.2	— 1.3	— 2.3	+ 2.5	— 4.7

FEBRUARY.

Port Blair,		— 3.0	— 1.0			— 5.0
Cuttack,				— 7.2	+ 7.4	— 2.3
Chittagong,				— 8.6	— 1.4	+ 4.6
Jessore,	+ 3.4					
Dacca,				— 0.6	+ 0.6	+ 0.6
Hazaribagh,	+ 9.0	— 2.5	+ 3.5			— 3.0
Berhampore,		— 6.7		— 0.2		— 10.7
Silchar,			— 0.5	— 3.5	+ 2.0	— 1.0
Monghyr,		+ 0.5	+ 3.5	— 10.5		
Patna,	+ 20.0					
Roorkee,			— 9.5	+ 4.5		— 10.8
Sums,	+ 32.4	— 11.7	— 4.0	— 26.1	+ 8.6	— 24.6
Means,	+ 10.8	— 2.9	— 0.8	— 3.7	+ 2.1	— 3.1

MARCH.

Port Blair,		+ 6.5	+ 1.0			— 5.5
Cuttack,				+ 0.5	+ 0.2	— 2.3
Chittagong,				+ 2.0	— 1.2	+ 0.2
Jessore,	— 2.5					
Dacca,				+ 4.1	— 3.5	— 0.6
Hazaribagh,	+ 2.0	+ 7.5	+ 1.0		— 3.7	— 6.0
Berhampore,		+ 5.7		— 2.5		— 6.7
Silchar,			— 1.0	— 6.0	— 3.0	+ 4.5
Monghyr,		+ 1.0	+ 2.5	— 3.5		
Patna,	+ 12.5					
Roorkee,			+ 0.5	+ 4.2		— 9.6
Sums,	+ 10.0	+ 25.7	+ 4.0	— 1.2	— 11.2	— 26.0
Means,	+ 3.3	+ 6.4	+ 0.8	— 0.2	— 2.2	— 3.2



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APRIL.

STATIONS.	1868-9	1869-70	1870-1	1871-2	1872-3	1873-4
Port Blair,		+ 5.0	— 3.0			— 2.5
Cuttack,			+ 1.0	— 3.2	— 0.4	+ 3.0
Chittagong,			+ 5.6	— 3.5	— 2.0	+ 1.7
Jessore,	— 0.5					
Dacca,			+ 1.4	+ 3.2	— 4.2	+ 1.4
Hazaribagh,	+ 10.5	0	+ 2.0		— 7.5	— 4.0
Berhampore,		+ 2.2		— 6.7		— 6.7
Silchar,			— 5.5	— 4.5	— 4.5	+ 10.0
Monghyr,		— 3.5	+ 1.5	0		
Patna,	+ 2.5					
Roorkee,			+ 1.5	— 3.7		— 7.1
Sums,	+ 12.5	+ 3.7	+ 4.5	— 18.4	— 18.6	— 4.2
Means,	+ 4.2	+ 0.9	+ 0.6	— 2.6	— 3.7	— 0.5

MAY.

Port Blair,		+ 3.5	— 2.5			— 5.0
Cuttack,			— 7.0	+ 4.0	— 1.5	+ 1.9
Chittagong,			— 1.0	— 4.2	+ 6.6	— 6.9
Jessore,						
Dacca,			— 3.1	+ 1.6	+ 0.4	— 1.9
Hazaribagh,	+ 7.5	+ 1.5	— 6.0		— 8.0	— 1.2
Berhampore,		+ 7.5		+ 1.2	+ 8.0	— 2.0
Silchar,			+ 8.5	— 2.0	— 6.5	+ 8.5
Monghyr,		+ 3.0	— 7.0			
Patna,	+ 0.5					
Roorkee,			— 2.0		— 1.0	+ 2.4
Sums,	+ 8.0	+ 15.5	— 20.1	+ 0.6	— 2.0	— 4.2
Means,	+ 4.0	+ 3.9	— 2.5	+ 0.1	— 0.3	— 0.5

JUNE.

Port Blair,		+ 14.0				+ 6.5
Cuttack,			— 14.0	+ 9.0	+ 15.0	— 19.0
Chittagong,			— 2.5	+ 2.1	— 2.3	+ 5.4
Jessore,						
Dacca,			+ 2.5	+ 1.1	+ 0.1	+ 2.4
Hazaribagh,	+ 3.5	+ 7.5	— 4.5		— 4.5	— 12.0
Berhampore,	+ 3.0	+ 4.0			+ 4.2	— 0.5
Silchar,			+ 17.5	— 1.5	— 7.5	+ 14.5
Monghyr,	+ 5.0	+ 5.0	— 3.5			
Patna,	+ 4.0					
Roorkee,			— 4.0		+ 1.5	— 6.3
Sums,	+ 15.5	+ 30.5	— 8.5	+ 10.7	+ 6.5	— 9.0
Means,	+ 3.9	+ 7.6	— 1.2	+ 2.7	+ 0.9	— 1.1



JULY.

STATIONS.	1868-9	1869-70	1870-1	1871-2	1872-3	1873-4
Port Blair,		+ 3.0				+ 11.0
Cuttack,			+ 1.5	— 3.5	— 0.2	+ 4.9
Chittagong,			— 1.4	— 4.5	— 3.4	+ 3.7
Jessore,						
Dacca,			+ 3.1	+ 0.1	— 5.7	+ 4.1
Hazaribagh,	— 5.0	+ 7.0	— 8.0		— 4.2	— 2.2
Berhampore,	+ 0.5		— 3.5		+ 1.7	— 4.5
Silchar,			+ 9.5	— 3.5	— 1.0	+ 7.5
Monghyr,	— 2.0	— 2.0	+ 0.5			
Patna,	— 4.5					
Roorkee,			— 3.0		+ 11.1	— 12.1
Sums,	— 11.0	+ 8.0	— 1.3	— 11.4	— 1.7	+ 12.4
Means,	— 2.8	+ 2.7	— 0.2	— 2.8	— 0.2	+ 1.5

AUGUST.

Port Blair,		+ 3.0				— 9.5
Cuttack,			— 2.2	+ 2.2	+ 0.9	+ 0.6
Chittagong,			— 0.9	— 3.6	+ 3.6	+ 1.3
Jessore,						
Dacca,			0	+ 7.0	— 0.9	+ 2.4
Hazaribagh,	+ 0.5	— 2.0	+ 0.5		— 9.5	+ 2.2
Berhampore,	+ 10.0		— 2.7		— 7.0	+ 3.5
Silchar,			— 2.0	— 3.0	+ 7.0	+ 5.5
Monghyr,	+ 5.0	— 5.0	+ 1.0			
Patna,	+ 16.5					
Roorkee,			— 0.6		+ 2.8	— 1.2
Sums,	+ 32.0	— 4.0	— 6.9	+ 2.6	— 3.1	+ 4.8
Means,	+ 8.0	— 1.3	— 0.9	+ 0.6	— 0.4	+ 0.6

SEPTEMBER.

Port Blair,		— 3.5			— 2.0	+ 3.0
Cuttack,			— 5.7	+ 14.4	— 10.9	+ 3.7
Chittagong,			— 3.0	+ 0.4	+ 1.7	— 1.4
Jessore,		— 5.0				
Dacca,			— 4.9	+ 2.0	— 1.6	+ 8.1
Hazaribagh,	+ 1.5	+ 6.5			— 10.5	+ 0.5
Berhampore,	— 1.5		— 1.0		— 9.7	+ 5.5
Silchar,			+ 8.0	— 3.0	+ 6.5	+ 2.0
Monghyr,	+ 6.5	— 5.5	— 1.0			
Patna,	+ 6.5					
Roorkee,			+ 1.5		+ 3.1	+ 1.0
Sums,	+ 13.0	— 7.5	— 6.1	+ 13.8	— 23.4	+ 22.4
Means,	+ 3.3	— 1.9	— 0.9	+ 3.4	— 2.9	+ 2.8



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OCTOBER.

STATIONS.	1868-9	1869-70	1870-1	1871-2	1872-3	1873-4
Port Blair,	— 1·0	+ 6·0			+ 0·5	0
Cuttack,			— 4·0	+ 7·5	— 0·9	+ 0·1
Chittagong,			— 0·4	— 0·5	— 1·7	+ 4·0
Jessore,		— 2·1				
Dacca,			— 3·4	+ 0·4	— 0·1	+ 2·9
Hazaribagh,	— 5·5	+ 7·0			+ 1·5	— 7·5
Berhampore,	+ 8·0		— 1·0		— 11·2	+ 4·0
Silchar,			+ 8·0	— 11·0	+ 2·5	+ 15·5
Monghyr,	+ 0·5	+ 3·0	— 3·0			
Patna,	+ 1·5					
Roorkee,			— 0·5		+ 0·7	+ 2·7
Sums,	+ 3·5	+ 13·9	— 2·3	— 3·6	— 8·7	+ 21·7
Means,	+ 0·7	+ 3·5	— 0·3	— 0·9	— 1·1	+ 2·7

NOVEMBER.

Port Blair,	— 5·5	+ 2·0			— 3·0	+ 4·0
Cuttack,			— 13·0	+ 9·2	+ 0·8	— 4·7
Chittagong,			— 4·8	+ 7·4	— 3·9	+ 3·9
Jessore,		+ 7·9				
Dacca,			0	— 0·6	+ 1·6	+ 5·6
Hazaribagh,	0	+ 6·5			— 4·7	— 4·2
Berhampore,	+ 1·5		— 3·5		— 12·0	+ 2·0
Silchar,			— 4·5	+ 3·5	— 1·5	+ 14·5
Monghyr,	— 6·5	+ 5·5	— 1·5			
Patna,	— 2·0					
Roorkee,		— 7·5	0		— 4·1	+ 4·3
Sums,	— 12·5	+ 14·4	— 27·3	+ 19·5	— 26·8	+ 25·4
Means,	— 2·5	+ 2·9	— 3·9	+ 4·9	— 3·3	+ 3·2

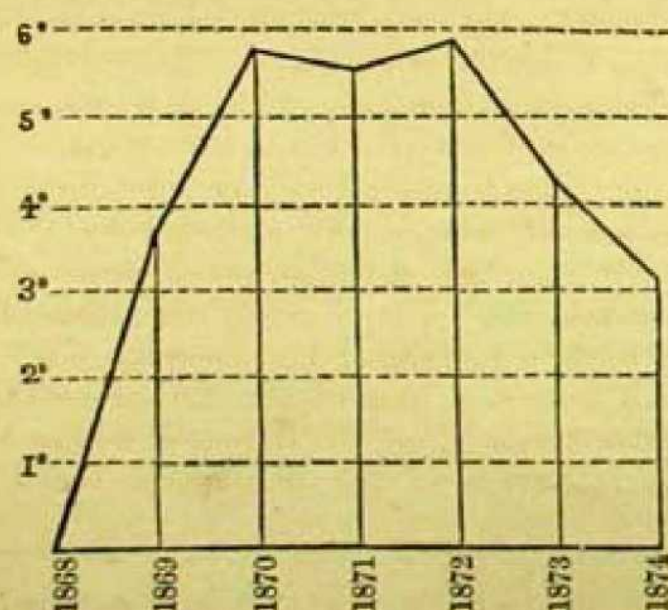
DECEMBER.

Port Blair,	+ 2·0	+ 4·0			+ 2·5	+ 1·5
Cuttack,			+ 1·5	+ 5·2	0	— 4·4
Chittagong,			— 4·2	— 4·8	0	— 1·3
Jessore,		+ 2·7				
Dacca,			— 0·6	+ 0·9	+ 0·4	— 5·9
Hazaribaore,	+ 1·5	+ 0·5			— 2·0	— 0·5
Berhamp	+ 1·2		— 3·5		— 12·5	— 9·0
Silchar,			— 2·5	0	— 3·0	+ 14·0
Monghyr,	+ 5·0	— 1·5	— 2·5			
Patna,	— 3·0					
Roorkee,		— 6·0	+ 3·5		— 8·9	+ 0·7
Sums,	+ 6·7	— 0·3	— 8·3	+ 1·3	— 23·5	— 4·9
Means,	+ 1·3	— 0·1	— 1·0	+ 0·3	— 2·9	— 0·6

TABLE IV. B.—*Mean monthly and annual differences of maximum black-bulb temperatures.*

MONTHS.	1868-9.	1869-70.	1870-1.	1871-2.	1872-3.	1873-4.
January,	+ 5.0	— 0.2	— 1.3	— 2.3	+ 2.5	— 4.7
February,	+ 10.8	— 2.9	— 0.8	— 3.7	+ 2.1	— 3.1
March,	+ 5.7	+ 6.4	— 0.8	— 0.2	— 2.2	— 3.2
April,	+ 4.2	+ 0.9	+ 0.6	— 2.6	— 3.7	— 0.5
May,	+ 4.0	+ 3.9	+ 2.5	— 0.1	— 0.3	— 0.5
June,	+ 3.9	+ 7.6	— 1.2	+ 2.7	+ 0.9	— 1.1
July,	— 2.8	+ 2.7	— 0.2	+ 2.8	— 0.2	+ 1.5
August,	+ 8.0	— 1.3	— 0.9	+ 0.6	— 0.4	+ 0.6
September,	+ 3.3	— 1.9	— 0.9	+ 3.4	— 2.9	+ 2.8
October,	+ 0.7	+ 3.5	— 0.3	— 0.9	— 1.1	+ 2.7
November,	— 2.5	— 2.9	— 3.9	+ 4.9	— 3.3	+ 3.2
December,	+ 1.3	— 0.1	— 1.0	+ 0.3	— 2.9	— 0.6
Yearly sums,	+ 41.6	+ 21.5	— 11.6	— 0.5	— 11.5	— 2.9
Means,	+ 3.5	+ 1.6	— 0.9	0	— 0.9	— 0.2

The results obtained by these four different methods, resting on two distinct kinds of data, agree then, in shewing a very decided variation of the incident solar heat; a variation which, in the epoch of its maximum approximately, its rapid rise before that maximum and slower decline after it, agrees with the variation curve of the solar spots. Table III being based on a far larger quantity of data than either of the others, probably gives the most trustworthy results. The curve obtained from this table is given in the adjoining figure.



What proportion the variation may bear to the total incident heat, the present data of course cannot show ; and in order to know this, we must await the regular actinometric observations which it is to be hoped may be undertaken at the new Solar Observatory under Col. Tennant at Simla. But judging from the present results, it would certainly appear probable that the variation is such as must exercise a very appreciable influence on the Meteorology of our earth. "It is a dynamical law absolutely universal and one which extends beyond the domain of mere dynamics, that all periodicity in the action of a cause, propagates itself into every, even the remotest effect of that cause, through whatever chain of intermediate arrangements the action is carried out."*

If then the sun's radiation vary directly with the number of the spots and prominences, every other meteorological phenomenon must likewise so vary, rainfall and temperature included, and we have therefore *a priori* grounds for the validity of Meldrum, Lockyer, and Köppen's discoveries. With regard to the rainfall, the coincidence of its variation with that of the sun spots has been only partially verified by the data ; but seeing that the rainfall of the larger part of the world has not been taken into consideration in the comparison, this is no more than we should expect. In India, for instance, the registers of most of the few stations that have been compared, fail to conform to the supposed law, but India is but a small part of the region on which precipitation takes place during the SW. monsoon, and I have shewn in a former volume of this Journal, that there are independent grounds for believing, that owing to protracted variations in the distribution of atmospheric pressure in different years, (from what causes arising we are at present unable to determine,) deficient rainfall in one part of the monsoon area is probably compensated in great part by an excessive rainfall elsewhere. As far as the coincidence has been established, the quantity of rain that falls, varies directly with the intensity of the sun's radiation ; in other words, with the quantity of energy received from the sun, which of course determines the quantity of water evaporated and afterwards condensed.

This consideration appears to me to throw some light on the apparently anomalous variation of temperature detected by Professor Köppen.† He finds that, in the tropics, the maximum temperature coincides, not with the maximum of the sun-spots, but more nearly with their minimum ; which, however, it precedes by $\frac{1}{2}$ to $1\frac{1}{2}$ years. His inference, partly based on this fact, and partly on his erroneous idea of the nature of the spots, is the reverse of that which follows from the facts now adduced. He concludes that the spots are an indication of the diminished radiation of the sun,

* Herschel's 'Meteorology,' p. 137.

† Zeitsch. d. Oesterr. Gesellschaft für Meteorologie, Vol. VIII, pp. 241 and 257.

and adopts the earlier hypothesis of De la Lande and of Zöllner that they are solidified scoriaceous masses floating on the glowing fluid surface [*“Schollen fest-gewordener Stoffe auf der glühendflüssigen Sonnenkugel”*]. The great discovery of Chacornac and Lockyer in 1865, that the spots are produced by a down-rush of the cooled external atmosphere of the sun, would seem to be unknown to him.

The spots being then, in all probability, an indication of increased radiation, how is this to be reconciled with the facts ascertained by Professor Köppen. Possibly, I think, in this way. The temperatures dealt with by Professor Köppen are of course those of the lowest stratum of the atmosphere at land stations; and must be determined, not by the quantity of heat that falls on the exterior of the planet, but on that which penetrates to the earth's surface, chiefly to the land surface of the globe. The greater part of the earth's surface being, however, one of water, the principal immediate effect of the increased heat must be to increase the evaporation, and therefore, as a subsequent process, the cloud and the rainfall. Now a cloudy atmosphere intercepts the greater part of the solar heat; and the re-evaporation of the fallen rain lowers the temperature of the surface from which it evaporates and that of the stratum of the air in contact with it. The heat liberated by cloud condensation doubtless raises the temperature of the air at the altitude of the cloudy stratum; but, at the same time, we have two causes at work, equally tending to depress that of the lowest stratum. As a consequence, an increased formation of vapour, and therefore of rain, following on an increase of radiation, might be expected to coincide with a low air-temperature on the surface of the land.

It is needless to point out that a vast train of enquiry is opened up by the fact, once established, that the solar heat undergoes a periodical variation. It is I believe of high importance to Meteorology, or will be so when the amount of the variation shall have been ascertained in terms of absolute measurement, and it affords a strong additional incentive to the establishment of an observatory in India, such as have already been founded under the less favoured skies of Germany and on the Rocky mountains, for observing and measuring the variations of the sun. These and their immediate effects are, by prerogative, the study of the tropics.

P. S. *July 12th.*—Since the foregoing paper was read, I have examined the register of Darjiling; a station which, although frequently obscured by cloud, has the advantage over stations on the plains, that it is above the level of the dust haze that absorbs so much of the solar heat over the latter. I have discussed the registers by a method somewhat different from either of those followed in the body of the paper, *viz.*, by selecting the three highest recorded sun temperatures in each half month, deducting from each the maximum temperature of the air in the shade on the same days, and taking

the mean of the six differences to represent the solar intensity of the month. The result, as will be seen from the following table, is in complete accordance with that previously arrived at from other data. The same thermometer has been in use throughout.

TABLE V.—*Solar intensity at Darjiling.*

STATIONS.			1870.	1871.	1872.	1873.	1874.	1875.
January,	..	..		57·8	67·7	59·2	57·8	62·3
February,	..	..		62·2	62·8	62·3	56·5	60·3
March,	..	..		63·3	63·5	62·	58·2	57·8
April,	..	..		64·2	63·2	62·8	55·7	60·2
May,	..	..	62·2	67·8	66·8	63·8	59·8	
June,	..	..	67·	68·	67·3	62·5	59·2	
July,	..	..	63·3	66·2	65·7	60·8	56·3	
August,	..	..	70·8	65·7	66·8	60·	57·8	
September,	..	..	71·5	69·3	63·7	62·3	59·3	
October,	..	..	65·5	68·2	70·	63·3	60·8	
November,	..	..	62·5	67·3	62·5	57·3	63·3	
December,	..	..	59·	66·3	59·	53·8	60·5	
Year,..				65·5	64·9	60·8	58·6	

VII.—*Notes on the Geology of part of the Daffa Hills, Assam ; lately visited by the Force under Brigadier-General STAFFORD, C. B.—By Major H. H. GODWIN-AUSTEN, F. R. G. S., F. Z. S., &c., Deputy Superintendent Topographical Survey of India.*

(Received June 18th,—Read July 7th, 1875.)

(With Plate VI.)

My survey duties with the late expedition into the portion of the Eastern Himalaya known as the Daffa Hills gave me an opportunity of making a few notes on the geology of this portion of the North-eastern frontier, of which so little is known up to the present time.

From the Brahmaputra near Bishnâth and Dunsiri Mukh, the outer range of the Tertiary sandstones is well seen, the steep scarps shewing white against the dense forest with which they are covered. I first entered this outer range by a route up the bed of the Darpang stream, a tributary of the Pichola, when proceeding to clear the hill Dihirhi Pârbat for a Trigonometrical station. After leaving Borpathar, the road leads over the plain in a direction WNW., and after 5 miles the shallow bed of the Darpang is followed up and leads directly by a narrow gorge into the hills: these rise suddenly from the level plain of recent detritus, no outlying beds of later age being seen here.

The strata dip about 20° NW., and consist of thick-bedded fine sandstones with strings of water-worn pebbles here and there, but no conglomerate was seen; they weather on the higher ridges into spheroidal masses indented with small holes, in a precisely similar manner to the upper sandstones of the Burrail range. The most conspicuous beds are of a very pale grey colour with black grains. Pieces of lignite are commonly found *in situ* and lying in the beds of the water-courses. The ravines are bounded by very steep sides, and are deep and gloomy. Looking from Dihirhi Párbat westward, the fringing range of the sandstones is well seen, rising at Gorusutia or Peak 1 of the G. T. S. into a sharp scarped point 3,319 feet high, but the ridge descends here and there on the line of strike to below 1000 feet. It presents the same feature all along of a steep scarp towards the plains, and of a slope dipping 20° — 25° NNW. towards the main mass of the mountains on the north, from which it is separated by a broad valley or “dhún” drained by the Pomah. This dhún is cut up by numerous ravines and low ridges all buried in dense forest.

To the eastward, 3 miles from Dihirhi Párbat, the sandstone ridge is much subdued. A change takes place in the strike of the mountain mass, and a broad forest-clad plateau, much intersected by ravines and about 200 feet above the plains, extends as far as the gorges of the Dikrang at Harmatti. On this side, the Borpani and Dikrang on their SW.—NE. courses represent and take up the continuation of the Pomah Dhun. At Harmatti is seen another quite recent deposit, in an alluvial plateau of sand, clay, and boulders, on which land for a tea-garden has been taken up. It corresponds to similar terraces in the Western Bhutan Duars, as those on the Jholdaka, &c., but is nowhere more than 30 to 40 feet above the river bed, and is found fringing the older rock slopes for some distance up the valley and to the eastward. It lies against a broad extent of very low intricate hills, which, from this towards the east, are a conspicuous feature. The very hurried examination I was able to make of these beds near Harmatti shewed them to be ferruginous-coloured sandstones and thick conglomerate beds resting on fine blue grey sandy beds dipping 5° to South-eastward. No lignite was seen *in situ*, but rolled pieces were common in the bed of the stream, evidently brought down some distance. At Harmatti similar beds dip 15° SE.; they appear to me to represent the newest beds of this Tertiary series, here extending out into the plains beyond the strike of the 1st or Dihirhi Párbat line of elevation. This line is taken up again east of the Dikrang by a low ridge which bounds the river on the SE. as far as the great bend it takes 10 miles above the junction of the Borpani.

Leaving the stockade at this junction, the winding bed of the Sibjúli is followed, and this $1\frac{1}{2}$ miles farther is joined by the Niosi, a much larger stream. In the bed of the last, the gravels are found to be a great mixture

of gneiss, clay shales, and dark-coloured sandstones belonging to a different series of rocks, with a few pebbles from Tertiary sandstones, shewing that the river must cut through the whole series of stratified rocks up to the metamorphics. This I afterwards found to be the fact. I found here several pieces of silicified wood (a large grass) 8 inches in diameter. The first exposed section, seen about four miles further up the Sibjuli, presented the Tertiary sandstones with a high dip, 75° SE by S. : these are here very dark and hard, thick-bedded, with a slight violet tint. They contain no pebbles, and are of a different character from the outer or Dihirhi group of beds. At the low pass over into the Harjuli they are thin-bedded, softer, and vertical. Passing on northward, on the SE. spur from Tánir Peak, the sandstones are horizontal, and evidently roll over at the Peak to 35° NW., which is the dip all along the crest of this second ridge. Crossing it and proceeding down the spur to the Dikrang, at the few places where the sandstone is uncovered, the dip has become high to the North-west-ward.

But it was on the Dikrang itself that the most interesting section was obtained. On following up the first and eastern stream on the right bank of that river near Camp No. 6, below the village of Shikhi (Phekis), the first trace of an older series of rocks was found, about a quarter of a mile up the bed, where a dark, hard, heavy sandstone occurs, vertical with a NE.—SW. strike. The soft Tertiary sandstones immediately succeed, having a local dip E. by S. 75° : they are much crushed, very thick bedded and micaceous, with scattered small pebbles, and they appear the equivalents of the sandstones of Dihirhi. Proceeding up the bed of the next stream (the largest, which I shall, for the sake of distinction, call the Tánir júli, because it drains the northern face of the Tánir ridge), we first come upon the Tertiary sandstones nearly perpendicular, strike SW.—NE. ; a very few yards further on are clay shales, very dark and carbonaceous, dip 70° high, NW. Some 50 yards further up the stream, the dip was reversed to 75° ESE., with considerable crushing, and here occurred a thick seam of black carbonaceous shale 5 to 6 feet thick, interstratified with dark close-grained sandstones ; this can be traced along the strike NNE.—SSW. for 200 yards, as it crosses the bed of the stream three times. It is rather a crushed splintery coal than a shale, and no doubt would prove better below the surface. Where now exposed it is either in the water or just out of it, in fact, to see it at all one has to wade up the bed of the stream, the jungle on the banks being too thick to move about in.

It was most interesting to come on these rocks in this position, as they are no doubt the representatives of the Damúda Series lately examined and worked out along the base of the Darjeeling and Western Bhútán mountains by Mr. F. R. Mallet,* and first noticed by Dr. J. D. Hooker in 1849, near

* Memoirs of the Geological Survey of India, Vol. XI, Pt. I.

Pankabári. The coal seam has exactly the flaky structure described by Mr. Mallet. The crushing to which it has been exposed has apparently altered its original and probably even thickness, both the upper and lower surfaces being waved irregularly, so that it never retains the same thickness for many yards together along the strike. I could not find time to follow the ravine further, but, at the head of the valley, a full section of these beds would be found along the low ridge connecting the Tánir Lampah with the Misa Párbat ridge. The boulders and gravel consisted principally of (1) the hard sandstone of a pale blue slaty colour, the darkest often speckled with minute grains of quartz (?); (2) a few of the soft Tertiary sandstones, but these apparently soon get ground away; (3) a very hard lighter coloured rock of the Damúda Series; (4) some hard conglomerate; and (5) a few of gneiss from the ridge on the north side of this valley, on which is the little hamlet of Dápú.

I am inclined to think there is unconformity between this Damúda series and the sandstones, but the crushing is great and renders it very difficult to make out clearly; exposed sections being so very scarce. There cannot, however, be here a greater thickness of Damúdas than 1000 feet in the area intervening between the sandstones and the quartzites and gneiss. Overlying the denuded outcrop of the Damúdas, in this lateral valley, is a mass of sandy clay and large sub-angular blocks (some 15 feet long) of the harder strata and quartzitic sandstones, &c.; this, combined with the dense forest, affords a geologist few opportunities of seeing much. The Tánir júli marks the junction of the stratified rocks and the metamorphic series, for some distance, by its wide open valley, the breadth corresponding with the outcrop of the whole Damúda series. The valley of the Dikrang corresponds with the continuation of this outcrop for a long distance to the NE.; its very probable extension westward is marked on the map by several streams excavated on the main line of strike, along the base of the gneissic rocks.

Having once found this thick carbonaceous seam,* it was very easy to follow it up. It crosses the Dikrang in a NE. direction and shews on the left bank close to the suspension bridge, beyond which it leaves the river and becomes covered up with alluvial deposits. Down the Dikrang from this spot, a set of very hard compact sandstone strata, perpendicular and shewing metamorphism, is exposed along the bed of the river, and, about half a mile down, their junction with the unaltered soft Tertiary sandstones is capitally displayed on the right bank. The latter rocks have a high southerly dip, and although having the same strike, gave me a still stronger impression of their unconformity.

* This coal would have to be worked up into an artificial fuel, such as is described by Mr. Mallet at page 60 of his memoir.

To the Damúdas, quartzitic beds succeed, some very white, but I nowhere found an actual contact. On the road to the bridge built by the force above Camp No. 6, a dark green rock is conspicuous by its very trappean appearance: at the bridge a very white quartzite underlies it, dipping 55° SE. These metamorphic rocks have a regular strike SW.—NE., nowhere better seen than from Zorúpútú; that peak with the peaks of Dorkorpútú and Shengorh lying in the main axis of elevation in a true NE.—SW. line. The metamorphics seem to pass by degrees into micaceous schists and hornblendic gneiss (which was noticed 3 miles above the bridge), and then into true granite with large feldspathic crystals, very similar to that of the North Khási Hills, at the Kollong rock, &c. The peaks of Misa Párvat and Shengorh are of this granite. Near Camp 9, under Nanang's village, the gneiss was very talcose, tale occurring in pieces of an inch square or more. The quartzites, mica schists, &c., probably represent Mallet's "Daling Series."

River-terraces of Recent Age.—Near the junction of the Tánir júli with the Dikrang, a higher and a lower terrace are well-marked features: they are composed of sand, clay, and large transported blocks, more or less rounded. The lowest is well seen on the left bank about 20 feet above the river bed at Camp 6. The highest, between that and the bridge about one mile above, has a thickness of some 125 feet. Their deposition here no doubt occurred during the period of glacial extension throughout the Himalayan Range, and they would naturally have accumulated more at the junctions of large lateral valleys than elsewhere. The remains of these terraces are to be traced at intervals up the valley, notably at Pachitah, but the highest is not seen in the valley below Nanang's village and above the junction of the Niúmtay.

The Burroi Gorge.—At the deep pool where the Tertiary sandstones are first seen on the left bank there is an interesting section. The beds are dipping about 50° towards the plains; the denuded surface is smooth and undulating, and here not more than 8 to 10 feet above the water level (March). Proceeding up the river about a quarter of a mile to the next large pool, the same section is again seen, but the upper surface of denuded sandstone is there quite 15 to 20 feet above the river, shewing a very considerable slope of the old earth-surface from the hills. On this surface rests a very recent series of iron-coloured sands and gravels, quite 60 or 70 feet thick, nearly horizontal, but the very slight incline is towards the Southward. These beds abut against the older rocks, which soon commence to rise into well-marked spurs from the outermost range.

These comparatively recent deposits are no doubt the same as those composing the plateau at Beháli Tea-garden, miles out in the plain towards the Bramaputra, and also of the Bishnáth plain. About 300 yards below

the first deep pool (where our camp was pitched), near the head of the next rapid, the last of the Tertiary rocks is exposed in the water and about a foot out of it, and dips south about 70° , the strata apparently falling over into a sharp uniclinal. This feature I have introduced into the section from Harmatti to the Tánir Ridge as it probably extends along the whole base of the hills, but is covered with the more recent alluvial deposits.

To the west of the Burroi, the sandstone range has a general dip NE., but a very conspicuous longitudinal roll occurs at the second large ravine west of the main gorge. The strata immediately east of this ravine dip 50° W., while in the main gorge of the Burroi they have a general easterly underlie, but are a good deal crushed and exhibit high dips. To the west the beds are much less disturbed and again assume regular dips of 30° to 40° northerly, the whole series gradually ascending towards Gorusuttia to the main longitudinal axis of elevation. Looking at the hills 20 miles to the west of the Burroi, the dip of the lowest outer range appeared 20° southerly, producing a long even slope towards the plains.

The Bisnath Plain.—I first came on this remarkable portion of the country, on the road between Rangali and Burigaon, just after crossing the Borgang, which has a wide sandy bed, but a volume of water not more than half that of the Burroi. The rise is sudden out of the "kadir" land of the former river, and about 20 to 25 feet, succeeded at from 200 to 300 yards by another of perhaps 3 feet, but very distinctly marked. The surface is perfectly flat, covered with a thin growth of grass, a few of the highest stalks of which may be about 6 or 7 feet high, but it is a short grass for Assam. Patches of forest of a few acres in extent are dotted about here and there, their limits very defined and generally round or oval in shape. The plateau ends abruptly on its southern side, towards the Brahmaputra, but its edge is irregular in outline, having been scooped into by the river in its wanderings from side to side. Traces of the former channel occur in the re-entering angles, in long crescentic pieces of water fringed with marsh and high reeds and grasses; these extend mile after mile to the main river. The view from the plateau, especially off the back of an elephant, is very fine, the dead level surface stretching afar, the line of horizon only broken here and there by a solitary tree or by the embankment of some old tank, for the day has been when all this area was thickly studded with villages. The low scarps of the dry nulla east of Burigang rest-house shew that there the plateau is sandy, and small rounded pebbles, mostly of quartz, occur quite near the top of the section. On the Sudoro, however, away from the influence of the ancient Borgang, red clay predominates, as well as in the scarp to the west of Partabghar, where the plain of Bisnath ends. The thickness of the alluvium here appears much greater, but there is no

real increase; the Giladeri nulla has cut into the alluvium and flows at its very base, and, instead of the usual gradation of fall from terrace to terrace, the whole thickness is seen at once and amounts to some 40 feet. The high level of the Bisnáth Plain is seen from here to extend on the north and north-west by the tea-gardens of Diplonga and Dikro, and an isolated high patch of alluvium occurs about 4 miles west of Sútia, gradually falling by steps at long intervals into the present level of the land on both banks of the Barowli. A series of accurate levels taken over this country would be most interesting, but that it is of the same age as the clay plateau at Tezpúr and many other places in the Assam valley as far down as Gwálpára is certain. It could only have been formed under very peculiar conditions,—in still water, with the surface higher than it now is towards the delta, and with a far larger water supply from the mountains; gradual subsidence in the direction of the delta to the extent of a few feet and change of climate would soon model such outliers of an alluvium probably coeval with the extension of the Himalayan glaciers, the fine mud and sand from which would form just such clays and sands as the plateaus are composed of.

VIII.—*Note on the molluscan Genera Cælostele, Benson and Francesia, Paladilhe, and on some species of Land-shells from Aden.*—By W. T. BLANFORD, F. R. S., F. G. S.

(Received June 24th;—Read July 7th, 1875.)

In the 'Annali del Museo Civico di Storia naturale di Genova' for 1872, Vol. III, p. 5, is a description by Dr. A. Paladilhe of *Francesia*, a supposed new genus of Asiatic mollusks. As the typical form of the genus was found in India by Benson, a short notice of this paper may be useful to Indian naturalists, the more so as there is, I think, good reason for doubting whether the genus is really undescribed, and there are some details in the paper in question, and in a subsequent one, containing descriptions of some mollusca from Aden, which require correction.

The genus *Francesia* was proposed by Dr. Paladilhe for a small species found by M. Issel close to Aden, and recognised by its describer as identical with a specimen from the banks of the Jumna sent to him by Prof. Mousson. This Indian shell was received by Mousson from Benson under the name of *Carychium scalare*. M. Paladilhe relates at length the enquiries which he undertook in order to ascertain if this *Carychium scalare* was described, and after consulting various authorities, amongst whom were Messrs. Gwyn Jeffreys and Hanley, he concluded that it was not; Mr.

Hanley assuring him that the name could not even be found in Benson's manuscripts.

It is quite true that no such species as *Carychium scalare* was ever described, but I cannot help feeling some surprise that none of the naturalists consulted should have noticed that a description of the shell was published by Benson in 1864 as the type of a new genus under the name of *Coilostele* (more correctly *Cælostele*) *scalaris*.* There cannot, I think, be any hesitation in identifying the species; the types were procured from the banks of the Jumna and Betwa, and the new genus *Coilostele* is, though with some little doubt, ascribed to the *Auriculacea* and compared with *Carychium*. The description agrees in all the external characters of the shell with that given by Dr. Paladilhe; in the latter, it is true, no mention is made of the absorption of the axis in the apical whorls, from which character the name *Cælostele* is derived, but this might be easily overlooked, and there cannot, I think, be much doubt as to the identity of the two genera *Cælostele* and *Francesia*, the former name having priority by 8 years.

There appears, however, to be a specific distinction between the Indian and Arabian forms which has escaped the notice of Dr. Paladilhe. The Indian *C. scalaris* is described by Mr. Benson as smooth (*testa lævi hyalina nitida*), whilst the Aden *Francesia scalaris* is said to be finely and very regularly marked with very elegant rather flexuous costulations. I have recently procured specimens of the Indian form from the neighbourhood of Karáchi in Sind, which agree with Mr. Benson's description and are entirely destitute of costulation.

As has already been mentioned, the genus *Cælostele* was referred by Benson, though not with great certainty, to the *Auriculidæ*, his principal reason being that he found the axis of the spire to be obsolete or absorbed as in *Auricula*, *Pythia*, and several other genera of *Auriculidæ*.† Paladilhe looked upon his *Francesia scalaris* as probably a fresh water mollusk, and he proposed to attach it provisionally to the family of the *Lymnæidæ*.‡ His principal reason, as he states, for believing it to be of aquatic origin, was that the numerous specimens examined by him had the whole shell and especially the aperture free from clay or mud, whereas he had noticed that small terrestrial mollusca, such as *Pupa*, *Vertigo*, &c. when left on the banks of torrents or rivers by floods (the position in which alone *C. scalaris* has

* Ann. and Mag. Nat. Hist. Ser. 3, XIII, p. 136. See also Zool. Record, 1864, p. 235 under *Auriculacea*.

† I find that the axis is equally wanting in the upper part of the spire in Sind specimens.

‡ He subsequently explained that in his opinion it was allied to the singular little genus *Moitesseria*, which is said to be aquatic, and on this account he had believed it allied to the freshwater pulmobranchs (Issel. Ann. Mus. Civ. Gen. IV, p. 525).

hitherto been found), have their surface more or less dirty and their orifice filled with detritus, the reverse being the case with fluviatile species.

Issel, who collected the *Aden* specimens, in a paper published* soon after that by Paladilhe, gives his reasons for disputing the systematic position assigned to *Francesia* by its author, and for considering it a terrestrial and not a fluviatile mollusk. In his opinion it belongs to the *Helicidæ*, and is allied to *Bulimus*. He points out certain characters which it has in common with *Stenogyra*, *Cæcilianella* and *Ennea*.† I think that there can be very little doubt as to the correctness of Issel's view so far as the terrestrial nature of the mollusk is concerned, and that his opinion of its affinities to the *Helicidæ* are more probable than Benson's supposition that the genus belongs to the *Auriculidæ*, or Paladilhe's that it should be assigned to the neighbourhood of the *Lymnæidæ*. I cannot see that the absorption of the spiral axis, the character upon which alone Benson appears to have relied, is sufficient evidence of affinity, because it is found in gastropodous genera belonging to widely different families, *e. g.*, in *Nerita*, and there is no other character in which the shell of *Cælostele scalaris* is shewn to have any close resemblance to *Auricula*; whilst the reason assigned by Paladilhe for supposing his genus *Francesia* fluviatile, the complete freedom of the shell, and especially of the orifice, from clay or sand is certainly an insufficient argument, at all events in those countries in which *Cælostele* has hitherto been found. I have just examined a small collection of minute shells, picked out from flood deposits in Sind, and amongst them I have found several specimens of *Planorbis* and *Bythinia* with their aperture filled with sand, whilst this appears to be very rarely indeed the case with the minute *Achatina balanus* of Benson, a species which Paladilhe assigns to *Francesia*, but evidently without having a clear idea of the species, for he, immediately afterwards, unless I am greatly mistaken, redescribes it as a new species under the name of *Cæcilianella Isseli*.

It is very singular that the animal of *A. balanus* should never have been observed and that we should be as much in doubt about its real affinities as we are about those of *Cælostele*. I am strongly disposed to believe that it is very closely allied to a shell described by Crosse from New Caledonia under the name of *Geostilbia Caledonica*.‡ The figure representing this form might almost be mistaken for that of *Achatina balanus*, but the geographical position of *Geostilbia Caledonica* is unfavorable to its identification with

* Ann. Mus. Civ. Gen. IV, p. 521.

† This genus does not belong to the *Helicidæ* but to a distinct family. Conf. Dohrn, Malakoz. Blätt. XIII, p. 129; and Stoliczka J. A. S. B., 1871, XL, pt. 2, p. 159.

‡ M. Crosse very kindly gave me a specimen of this shell, but I have unfortunately left it in England and am unable to compare it with *Achatina balanus*.

the Indian species, which is found in the drier parts of India and apparently in other parts of South-western Asia where the fauna has Arabian and African affinities. The animal of *Geostilbia* has not been examined, but it is said to live underground. It is far from improbable that both *Cælostele scalaris* and *Achatina balanus* have a similar habitat, and this would account for their not having hitherto been observed living.

I think that there is some possibility too that these forms may be allied to *Ennea*, *Streptaxis*, and *Streptostele*. All have the very peculiar glassy structure characteristic of the *Streptaxidæ*. If this be the case, the animal will probably be brightly coloured, yellow or scarlet, or both. It is to be hoped that some Indian naturalist may succeed in obtaining these species alive and determining their affinities.

If the opinions above expressed be correct, the synonymy of the two forms of *Cælostele* will be the following :

1. *CÆLOSTELE SCALARIS*.

Coilostele scalaris, Benson, Ann. & Mag. Nat. Hist., 1864, Ser. 3, XIII, p. 136.

Hab.—Western and North-western India.

2. *CÆLOSTELE* sp.

Francesia scalaris, Paladilhe, Ann. Mus. Civ. St. Nat. Gen., 1872, III, p. 10, Pl. I, fig. 1-4.—Issel, ib, IV, p. 521, 530.

Hab.—Aden in Arabia and Sek Said Island, Dahalac Archipelago, Red Sea.

I do not propose a new name for the second species, although I think it requires one, because I have a great dislike to giving names to species which I have not seen, because there is still a possibility that the genus *Francesia* may not be identical with *Cælostele*, as the peculiar character of the latter, the absorption of the axis in the upper whorls, has not been observed in the former, and thirdly because I consider the practice so prevalent amongst some naturalists of giving new names to everything they are unable to identify extremely objectionable and liable to cause confusion. I trust, however, that either M. Issel or M. Paladilhe will re-examine the Aden shell, and, if, as I anticipate, it proves to belong to the genus *Cælostele*, re-name it.

Besides *Francesia scalaris*, the following species are described from Aden by M. Paladilhe :

1. *Bulimus Yemenensis*.

2. *B. Samavaensis*, Mousson MS.

3. *B. vermiformis*.

4. *B. cerealis*.

5. *B. lucidissimus*.

6. *Limicolaria Bourgignati*.

7. *Ennea Isseli*.

8. *Pupa Antinorii*.

9. *Cæcilianella Isseli*.

10. *Physa Beccarii*.

Of these, *Cœcilianella Isseli** I believe, as I have already stated, to be identical with *Achatina balanus* of Benson. *Bulimus Samavaensis*, *B. cerealis* and *B. vermiformis* appear all to be varieties of the widely spread and variable *Pupa cœnopicta*, Hutton. This has already been indicated in the case of *B. cerealis* and *B. vermiformis* by Morelet (Ann. Mus. Civ. III, p. 201.) and Issel states that *B. Samavaensis* has also been identified with *B. cœnopictus* by the same naturalist.† It is quite true that the shells named by M. Paladilhe present well marked differences, and that the circumstance of all being found in one place is opposed to the idea of their being races of one species. At the same time it does not follow that all these forms inhabit the same spot because their shells are carried down by the same torrent and mingled in the flood deposits, and I have similarly found two or three varieties together in various parts of India. I have examined a large number of specimens from the drier parts of India, from Upper Burma, Persia, and Abyssinia, and although there are several well marked forms deserving distinctive names, I am inclined to believe that all pass into each other. At the same time I am not prepared to admit with M. Jickeli, as quoted by Issel, (Ann. Mus. Civ. IV, p. 528, note), that these tropical shells are identical with the North American *Pupa fallax* of Say. I have not access to Jickeli's original paper, and cannot say on what his opinion is founded. *Pupa fallax* is found in various parts of the United States, and the peristome is edentulous, and entirely destitute of the parietal tooth which is found more or less developed close to the posterior angle of the aperture in all forms of *B. cœnopictus*. Even should some shells of *B. cœnopictus* be undistinguishable from some of *P. fallax* it would, I think be well to compare the animals before uniting the two.

Issel has pointed out‡ that *Limicolaria Bourignati* belongs rather to *Stenogyra* than to the genus to which M. Paladilhe assigned it. I am unable to distinguish it from a very common variety of *Stenogyra* (*Opeas gracilis* (*Bulimus gracilis*, Hutton). M. Paladilhe considers it a peculiarly African form, but *Stenogyra gracilis* is found not only in India proper but in the Malay region.

It is remarkable that amongst the shells found near Aden, no form of *Bulimus insularis* (*B. pullus*, Gray) should have been comprised. One has

* My attention was called to this and some of the other identifications given below by my friend Mr. G. Nevill.

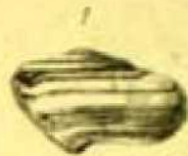
† Ann. Mus. Civ. IV, p. 527. I cannot however find the species mentioned by Morelet; can M. Issel has mistaken *Sennaarensis* which Morelet does identify with *P. cœnopicta* for *Samavaensis*?

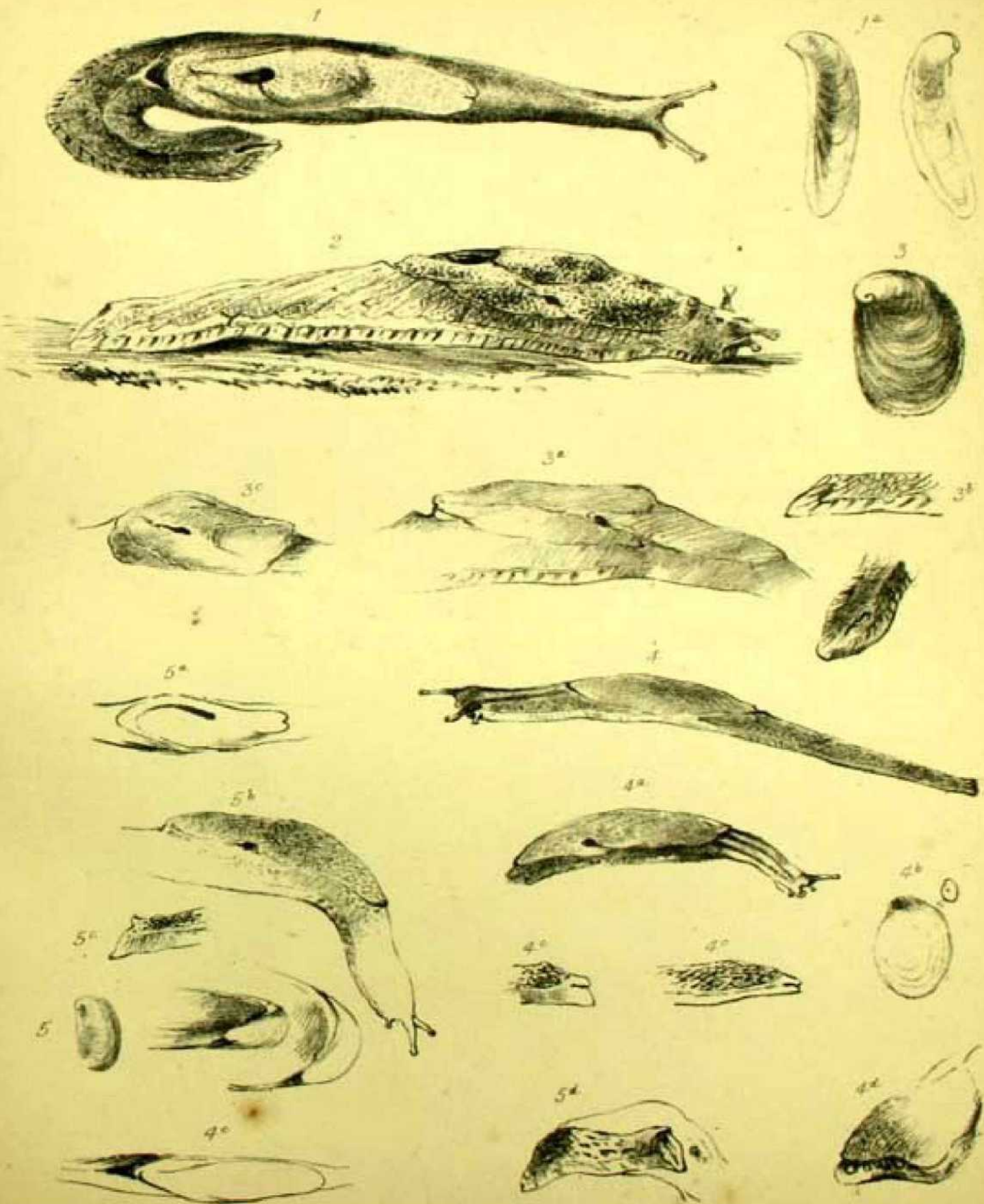
‡ Ann. Mus. Civ. IV, p. 523, note.

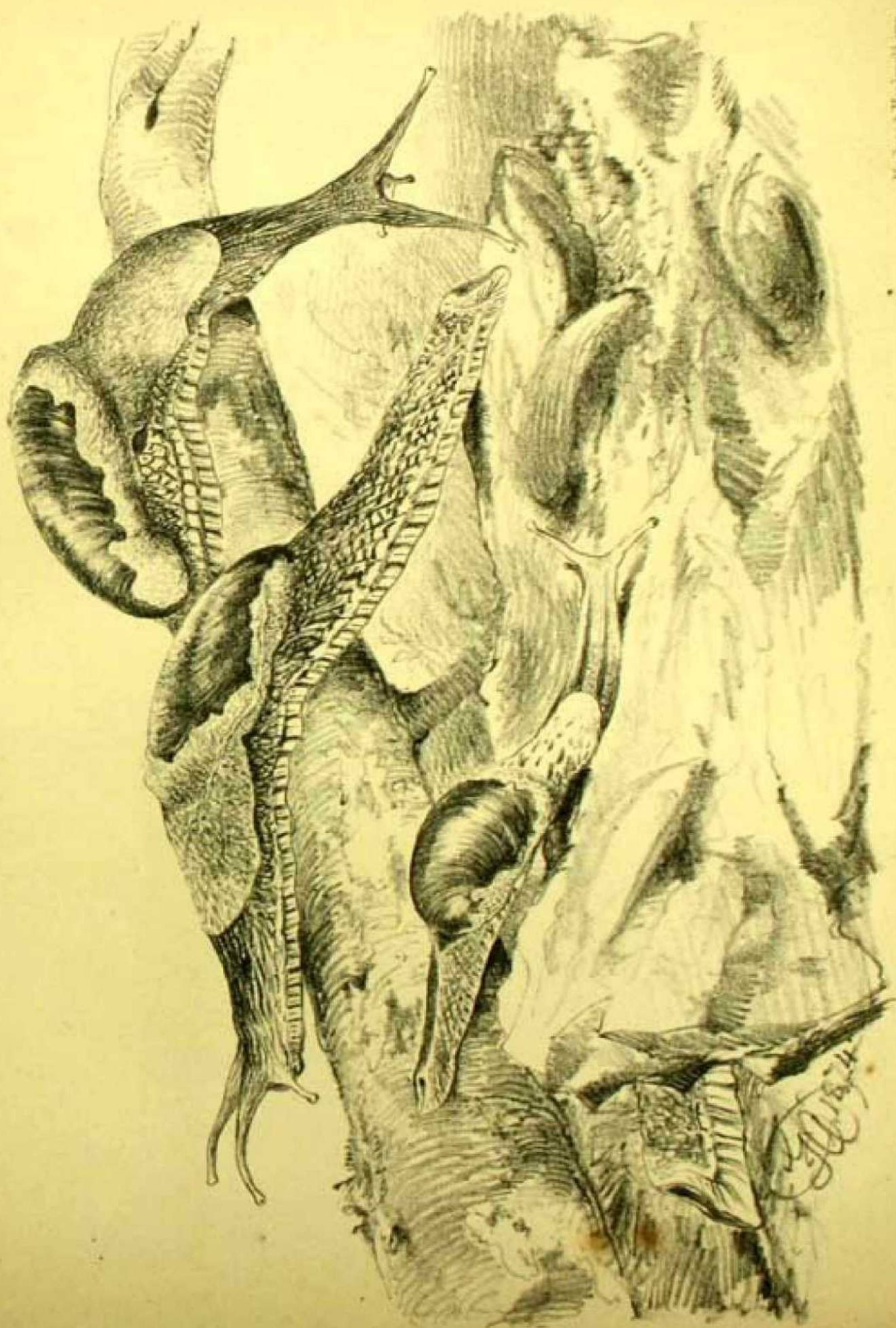
been described by Pfeiffer under the name of *B. Adenensis*. The species is at least as variable and nearly as widely spread as *B. cænopictus*.*

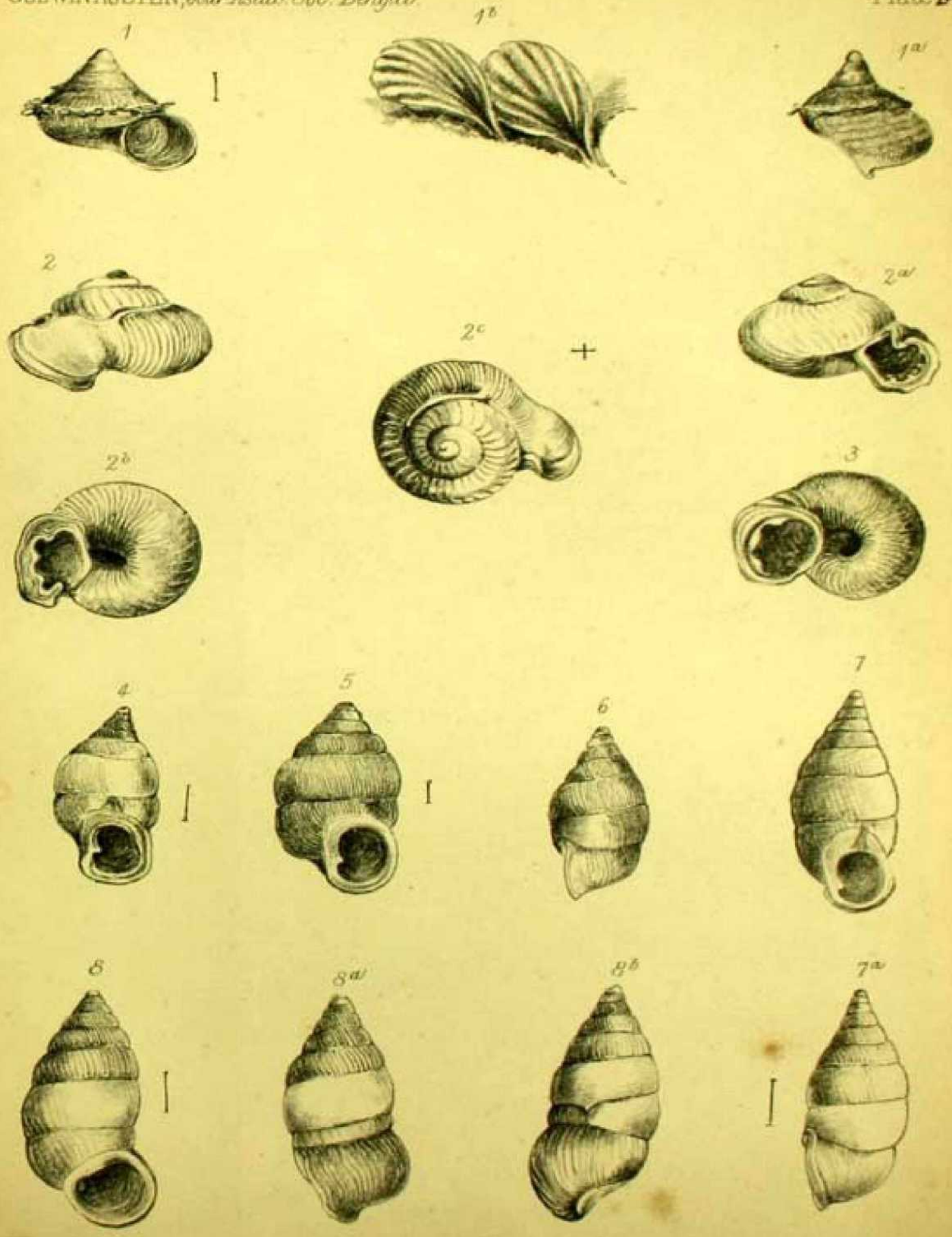
P. S.—Whilst the preceding paper was passing through the press, I received a letter from Colonel R. H. Beddome, in which he told me that he had compared, under the microscope, a specimen of *Geostilbia Caledonica* with a shell which he found in north Canara, and that they were identical. Now the north Canara shell was in all probability *Achatina balanus*, and if this be the case, it follows that the identity of that form with *G. caledonica* which I have long suspected, and to which I have referred at p. 43, is not merely generic, but specific.

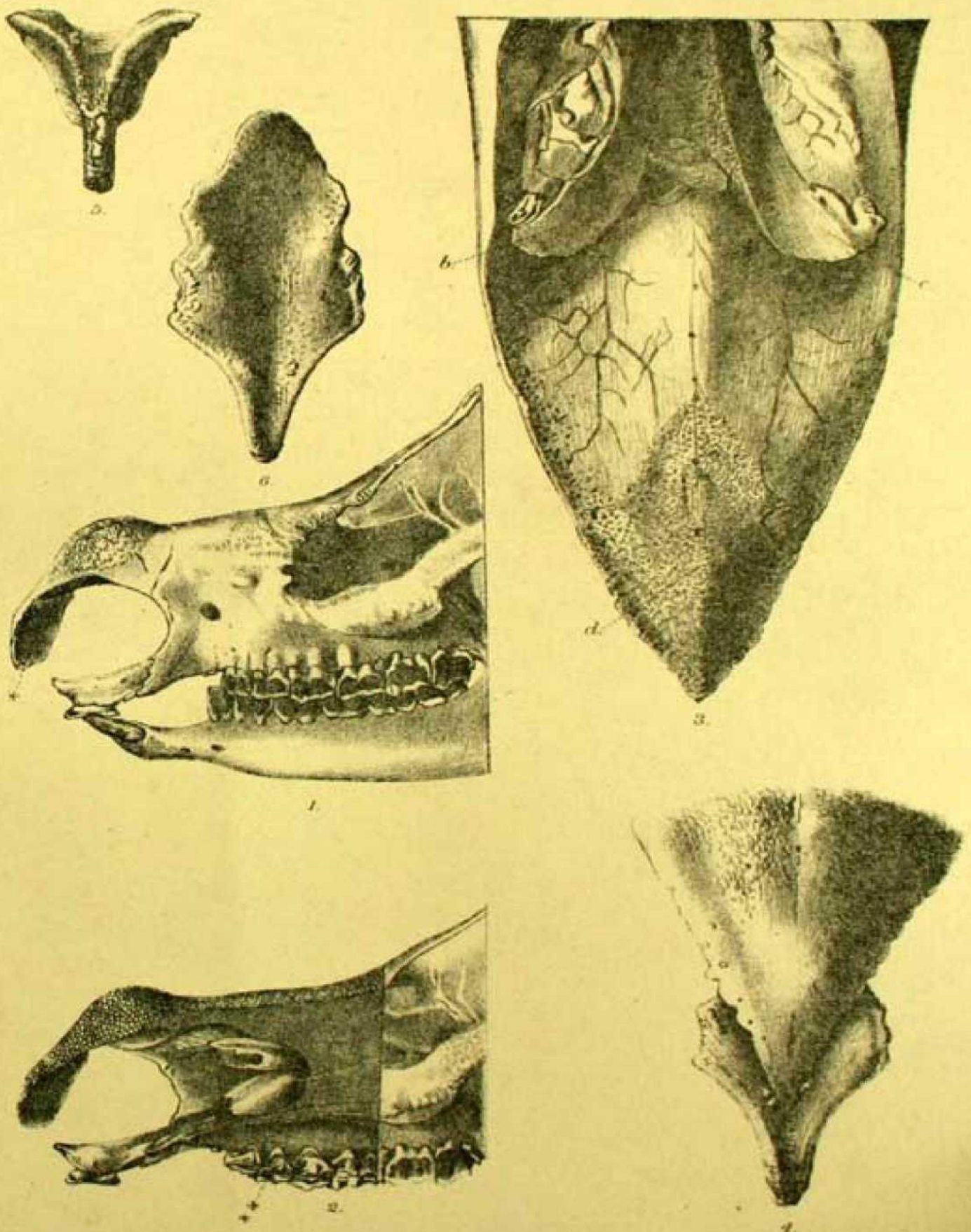
* In an excellent account of the land and freshwater shells of Borneo by Issel, also published in the *Annali del Museo Civico*, Vol. VI, p. 366, I am credited with the authorship of the genus *Optediceros*. This is a mistake. I never invented the genus, but I shewed (*Ann. and Mag. Nat. Hist. Ser. 3, XIX, p. 381*) that *Optediceros* of Leith, described in the *Journal of the Bombay Branch of the Royal Asiatic Society*, Vol. V, p. 145, is identical with *Assiminea*. I think, too, it is to be regretted that a shell like *Assiminea cornua*, Pfeiffer *nec* Leith, should still be referred to *Hydrocena*, and *Assiminea carinata*, Lea to *Omphalotropis*. Martens long since pointed out (*Malakoz. Blätt. 1864, p. 142*.) that the type of *Hydrocena* belongs to a very different family, (*Georissa* is very close to it if not identical,) whilst I have shewn (*Ann. and Mag. N. H. 4, III, p. 340*) that *Omphalotropis* belongs to the *Cyclostomidae*. *Assiminea* on the other hand is a Rissoid.







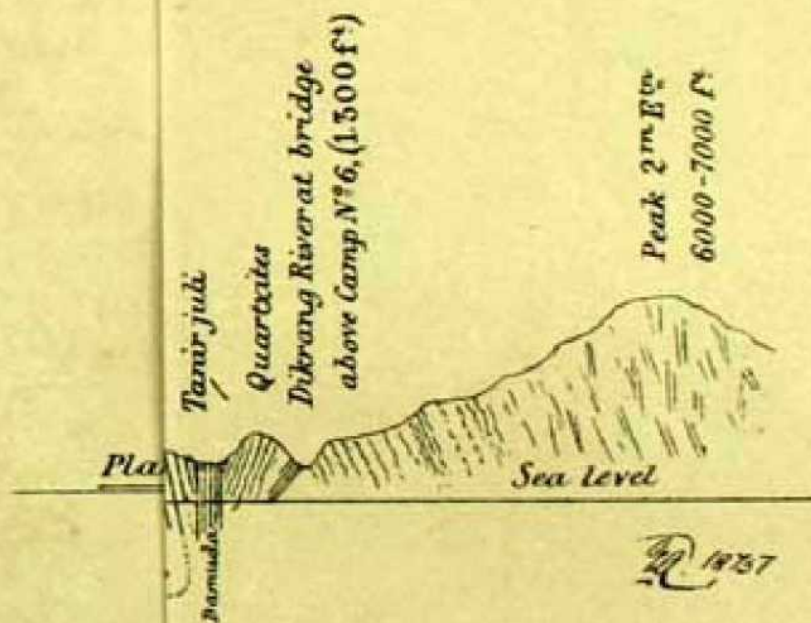




J. Schaumburg, Lith.

RHINOCEROS SONDAICUS.

Plate VI.



Photomicrographed at the Surveyor General's Office Calcutta.

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Part II.—PHYSICAL SCIENCE.

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IX.—*On the General Theory of Duplex Telegraphy.*
By LOUIS SCHWENDLER.

(Continued from Vol. XLIII, Part II, 1874.)

In the two preceding investigations* I have given the solution of the *first problem* for the bridge method. This solution established the general result of the *double balance* being the best possible arrangement for the bridge method. In the present paper I shall endeavour to find the solution of the *first problem* for the *differential method*, which in practical importance ranges second to the bridge-method.

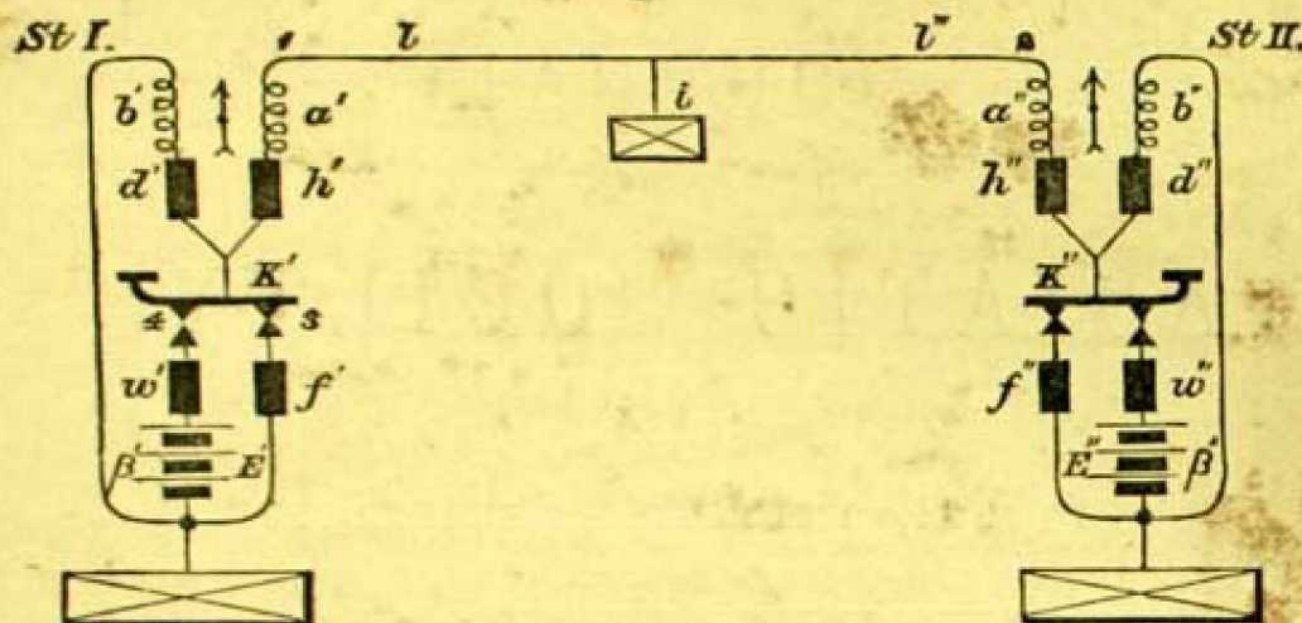
II. Differential method.†

This arrangement for duplex working is based on the well-known method, of comparing electrical resistances “differential method,” and Fig. 2 gives the general diagram when this method is applied for duplex working.

* J. A. S. B., Vol. XLIII, Part II, 1874, pp. 1 and 218; Phil. Mag., Vol. 48, 1874, p. 117 and Vol. 49, 1875, p. 108; Journal Telegraphique, Vol. II, p. 580.

† The differential method was originally invented, as stated before, by Mr. Frischen, and Messrs. Siemens and Halske. A particular case of this method was patented by them in England in 1854.

Fig. 2.



Explanation of the Diagram.

E , electromotive force of the signalling battery.

β , internal resistance of the signalling battery.

k , a constant resistance key.

a and b , the coils of the receiving instrument. These coils, for any sent current, have opposite magnetic effects with respect to any given magnetic pole external to the coils; while for any received current, these coils add their effects with respect to that same magnetic pole. By a and b shall also be designated the resistances of the coils.

d , w , f , and h are certain resistances, the necessity of which will become clear hereafter.

i , the resistance of the resultant fault of the line, acting at a distance l' from Station I, and at a distance l'' from Station II, (both l' and l'' expressed in resistances, so that $l' + l'' = L$ equal the "real conduction resistance" of the line).

The other terms, viz. L' , L'' , ρ' , ρ'' , c' , c'' , &c., which will necessarily be of frequent occurrence also in this paper, will bear the same physical meaning here as before.

The practical inferiority of the *differential method*, when compared with the *bridge method*, it will be clear at once, is that specially constructed receiving instruments on the differential principle are required. That, therefore, the introduction of Duplex Telegraphy based on the differential method would at once involve also a total change of the receiving instruments hitherto used. This is clearly a serious disadvantage from an administra-

tive and financial point of view. But besides this, without going into details, the differential method has also a very serious objection from a technical point of view. While in the bridge method the balance is obviously independent of the resistance of the receiving instrument, in the differential method the balance is clearly a function of the resistances of the two coils of which the receiving instrument consists, and as these two coils may alter their resistances independently, and not in proportion as indicated by the balance equation, a new element of disturbance is introduced, which the bridge method does not possess.

Besides this, differential instruments are necessarily mechanically more complicated than others, and require therefore superior workmanship, entailing greater expense to arrive at working efficiency.

General expressions for the two functions "D" and "S."

In order to obtain the two functions D and S , we have to develop the general expressions for p , P , and Q ; say for Station I.

p' in our particular case is the force exerted by the two coils a' and b' on one and the same magnetic pole when Station I is sending and Station II is at rest. This force is clearly the difference of the two forces exerted by the coils a' and b' .

Thus we have

$$p' = A' m' - B' n'$$

where A' and B' are the currents which pass through the two coils a' and b' respectively, when Station I is sending and Station II is at rest, while m' and n' are the forces exerted by these coils when the unit current passes through them. At balance in Station I, $p' = 0$

Further

$$P' = \mathfrak{A}' m' + \mathfrak{B}' n'$$

where \mathfrak{A}' and \mathfrak{B}' are the currents which pass through the coils a' and b' respectively, when Station II is sending and Station I is at rest (single signals).

Further

$$Q' = \mathcal{V}' m' + \mathcal{G}' n'$$

where \mathcal{V}' and \mathcal{G}' are the currents which pass through a' and b' respectively when both stations are sending simultaneously (duplex signals).

To get the most general expressions for these three forces p , P , and Q , we have to fix the signs of the two terms of which they consist. This is best done by considering the forces m and n as absolute numbers, and determining the direction in which they act with respect to one and the same magnetic pole by the direction of the currents passing through the coils a and b .

To fix the signs of the currents, we shall call, arbitrarily, that current positive which passes through the coil a in the sending station, when the negative pole of the signalling battery is joined to earth.

Further, if we suppose at the outset, that the movement of the key k does not alter the complex resistance ρ of its own station, *i. e.*, the fulfilment of the key equation

$$w + \beta = f$$

a condition which is essential, it is clear that the currents P' and Q' are the algebraical sums of the currents A' , \mathfrak{A}' and B' , \mathfrak{B}' respectively, whence it follows that

$$Q' = (A' + \mathfrak{A}') m' + (B' + \mathfrak{B}') n'$$

where the currents contain the signs.

Now, with respect to the manner of connecting up the two signalling batteries E' and E'' , we have the following two different cases :

1st. The same pole of the signalling battery is connected to earth in each station, thus :

$$p' = \pm A' m' \mp B' n'$$

$$P' = \mp \mathfrak{A}' m' \mp \mathfrak{B}' n'$$

$$Q' = (\pm A' \mp \mathfrak{A}') m' + (\mp B' \mp \mathfrak{B}') n'$$

where the upper signs are to be used when the negative poles of the signalling batteries are connected to earth in both stations, and the lower signs when the positive poles of the signalling batteries are connected to earth in both stations.

2nd. Opposite poles of the signalling batteries are connected to earth in the two stations, thus :

$$p' = \pm A' m' \mp B' n'$$

$$P' = \pm \mathfrak{A}' m' \pm \mathfrak{B}' n'$$

$$Q' = (\pm A' \pm \mathfrak{A}') m' + (\mp B' \pm \mathfrak{B}') n'$$

where the upper signs are to be used when the negative pole in Station I and the positive pole in Station II are connected to earth, and the lower signs when the reverse is the case.

Subtracting in either of these two cases P' from Q' , it will be seen that invariably

$$S' = Q' - P' = p'$$

or that, on account of having fulfilled the key equation $w + \beta = f$, the difference of force by which single and duplex signals are produced is equal in magnitude and sign to the force by which balance is disturbed. Further, that it is perfectly immaterial whether the same or opposite poles of the signalling batteries are put to earth. For reasons already explained I prefer to use the negative poles of the signalling batteries to earth in both stations, and this alternative we will suppose is adopted.

Thus we have :

$$p' = A' m' - B' n'$$

$$P' = -(\mathfrak{A}' m' + \mathfrak{B}' n')$$

$$Q' = (A' - \mathfrak{A}') m' - (B' + \mathfrak{B}') n'$$

If we now substitute for A' , B' , \mathcal{A}' , \mathcal{B}' their values, we get :

$$p' = \frac{E'}{N'} \Delta'$$

$$P' = - \frac{E' (b'' + d'')}{N''} \mu' \lambda'$$

$$\text{and } Q' = - \frac{E' (b'' + d'')}{N''} \mu' \lambda' + \frac{E'}{N'} \Delta'$$

the sign of p' being contained in Δ' , and where

$$N' = f' (b' + d' + a' + h' + c') + (b' + d') (a' + h' + c')$$

$$N'' = f'' (b'' + d'' + a'' + h'' + c'') + (b'' + d'') (a'' + h'' + c'')$$

$$\mu' = \frac{i}{i + l' + \rho'}$$

$$\Delta' = (b' + d') m' - (a' + h' + c') n'$$

$$\lambda' = m' + \frac{f'}{b' + d' + f'} n'$$

Thus the general expressions for the two functions D and S are :

$$\left. \begin{aligned} D' &= \frac{p'}{P'} = \frac{E'}{E''} \cdot \frac{N''}{N' (b'' + d'')} \cdot \frac{\Delta'}{\mu' \lambda'} \\ S' &= p' = \frac{E'}{N'} \Delta' \end{aligned} \right\} \text{for Station I.}$$

$$\text{and } \left. \begin{aligned} D'' &= \frac{p''}{P''} = \frac{E''}{E'} \cdot \frac{N'}{N'' (b' + d')} \cdot \frac{\Delta''}{\mu'' \lambda''} \\ S'' &= p'' = \frac{E''}{N''} \Delta'' \end{aligned} \right\} \text{for Station II.}$$

Rigid fulfilment of the two functions $D = 0$ and $S = 0$.

D can only become zero, for finite resistances of the branches, if

$$p = S = 0$$

i. e. if

$$\Delta = 0$$

Now, to keep $\Delta = 0$ we may adopt two essentially different modes of re-adjustment, namely :—

Either leave the coils and their armatures stationary, and adjust balance by altering the resistances of the branches $(a + h)$ and $(b + d)$ separately or simultaneously, or leave the resistances of these branches constant, and move the coils or their armatures. These two cases are to be considered separately.

(a.) *Re-adjustment of balance by altering the resistances of the branches.*

As a and b are resistances which in the form of coils have to exert magnetic force, it is impracticable to suppose them variable. If they have been once selected, they must necessarily be kept constant, whence it follows

that the re-adjustment of balance is restricted to a variation of the resistances h and d .

But as ρ is a function of h and d , to establish balance by altering one of them only, would invariably result in an alteration of ρ , and consequently *immediate* balance would become an impossibility.

Thus in order to readjust balance, and at the same time to keep ρ constant,* we must vary h and d simultaneously.

Now, it can be proved in exactly the same manner for the differential method as it was for the bridge, that in order to make the disturbance of balance for any given variation in the system as small as possible we must make ρ as large as possible, whence it follows from the form of ρ that

$$f = b + d$$

the "*regularity condition*" for the differential method.

But since

$$f = w + \beta$$

it follows that to re-establish balance by an alteration of the resistances h and d while a , b , β , and ρ keep constant, we have to vary *all* the four branches h , d , w and f simultaneously, in such a manner that their variations fulfil the following condition:

$$\delta f = \delta d = \delta w = - (2 \delta h)$$

which is simple enough to allow of its practical application; but which nevertheless shows again the inferiority of the *differential method* as compared with the *double balance*, i. e., in order to fulfil *immediate balance*, the *key equation*, and the *regularity condition* for the *differential method*, we have to make the four branches of the system simultaneously variable, while in the *double balance* the same effect can be obtained by having *one* branch only variable (the b branch).

It is worth while to mention here that there is a special case of obtaining *immediate balance* for the differential method by the adjustment in one branch, namely, when $f = 0$, for then ρ would be independent of d , and therefore balance could be obtained by varying d without altering p .

However, on account of the key equation $f = w + \beta$, it would follow from $f = 0$, that β must be zero also, which represents a physical impossibility inasmuch as the internal resistance of galvanic cells cannot be reduced

$$* \rho = a + h + \frac{(b + d)f}{b + d + f}$$

keep a , b and f constant and vary h and d , whence we should have:

$$\delta \rho = (b + d + f) (b + d + f + 2d) \delta h + f^2 \delta d = 0$$

an equation, which it is always possible to fulfil for any variations of h and d if taken of opposite signs, although it may be difficult to achieve it practically by a simple motion, such as that of turning a handle. The absolute value of these variations depends of course on the variation of c which disturbs the balance, and in order to have accelerated balance we ought to decrease h and increase d when c increases, and *vice versa*.

to zero, not even approximately. Besides the E. M. F. requisite for duplex working being necessarily comparatively large, β will always be a quantity which cannot be neglected against the other resistances of the system, even if the single cells were of small resistance.

But supposing it were practicable to construct a battery of exceedingly low internal resistance, then, as $f = b + d$, it would be necessary to make $b = 0$ and $d = 0$ another physical impossibility, as b must consist of convolutions to produce magnetism, and d must be variable to produce balance.

This solution $f = b + d = w + \beta = 0$, or even each of these three branches of an only exceedingly small resistance, must therefore be rejected.

(b.) *Adjustment of balance by moving the coils or armatures.*

This, it will be clear, is *the* solution for *immediate balance*, for such a mode of adjustment would involve no relation between the resistances of the three branches, leaving their determination free for other purposes. In order that the slightest movement of the two coils, or their armatures, may produce the required balance, it will be best to move both the coils or armatures simultaneously in the same direction. In fact to be able to produce balance, no matter how great the variation in the resistance of the line may become, it will be necessary to make the coils movable for the changes of seasons, and the armatures for the daily changes.

It is clear that the differential method, when balance is adjusted by the movement of the coils or armatures, can alone be compared in efficiency with the *double balance*, and the superiority of the latter is most striking. While *immediate balance*, and the fulfilment of the other two essential conditions, can be obtained with *the double balance method* within any given range by a variation of the resistance in *one* single branch (b branch), this same result with the differential method can only be arrived at by either supposing four branches simultaneously variable, or by supposing the coils and armatures movable,—both pre-supposing complicated mechanical arrangements requiring delicate workmanship and being liable to get out of order.

Rapid approximation of the two functions D and S towards zero.

Supposing the fulfilment of the key equation as one of the most essential conditions, we know that

$$p = S \text{ for each station invariably.}$$

Now for Station I we have

$$p' = S' = E' \frac{\Delta'}{N'}$$

where

$$\Delta' = (b' + d') m' - (a' + h' + c') n'$$

$$N' = f' (b' + d' + a' + h' + c') + (b' + d') (a' + h' + c')$$

If we call c' that value of the measured circuit, which for any given values of the two branches $b' + d'$ and $a' + h'$ produces balance in Station

I, *i. e.* for which $\Delta' = 0$, then if c' varies $\delta c'$, we have $\Delta' = n' \delta c'$, while N' becomes $N' + \delta N'$.

Thus we have

$$S' = E' \frac{n' \delta c'}{N' + \delta N'}$$

$$S' = \frac{E' n'}{f' + b' + d'} \cdot \frac{\delta c'}{a' + h' + \frac{f' (b' + d')}{f' + b' + d'} + c' + \delta c'}$$

but as $a' + h' + \frac{f' (b' + d')}{f' + b' + d'} = \rho'$ the complex resistance in Station I, and as further $\delta c'$ can be neglected against c' , we have finally:

$$S' = E' \frac{n'}{f' + b' + d'} \frac{\delta c'}{c' + \rho'}$$

Further n' , the force exerted by the coil b' on a given magnetic pole when the unit current passes through the coil, can be expressed as follows:

$$n' = r' \sqrt{b'}$$

where r' is a coefficient depending only on the dimensions and shape of the coil, on the manner of coiling the wire, and on the integral distance of the coil from the magnetic pole acted upon.

Thus we have

$$S' = E' \frac{r' \sqrt{b'}}{b' + f' + d'} \frac{\delta c'}{c' + \rho'} = E' \cdot W' \cdot \theta$$

Now supposing the factor W' constant,† S' becomes smaller the smaller θ is.

In the second part it has been proved quite generally that θ decreases permanently with increasing $\rho' \rho''$, no matter to what special cause the variation of c' is due, whence again it follows that ρ should be a maximum.

From the form of ρ however we see that for any given sum $b + f + d$, ρ becomes largest if

$$f = b + d$$

which is "*the regularity condition*" of the differential method.

* This expression supposes that the thickness of the insulating covering of the wire can be neglected against the diameter of the wire, which is allowable. r' is a constant with respect to b' .

† That W' can be kept constant while θ' decreases and $\frac{f'}{b' + d'}$ varies, and $f' + b' + d'$ is constant, it will be clear is possible, for if $d' > 0$ the variation of $b' + d'$ may be considered entirely due to a variation of d' , equal and opposite in sign to the variation of f' . If $d' = 0$ then we must consider r' variable with b' in order to keep W' constant while $\frac{f'}{b'}$ varies, which is admissible since the position of the coils has not been fixed as yet.

To have S' therefore for any variation as small as possible, we must make $f = b + d$. Substituting this value of f we get an expression for S' which shows that it has an absolute maximum for b but no minimum, from which we conclude that b should be made either very much smaller or very much larger than the value which corresponds to a maximum of S , but no fixed relation between b and d or a can be found.

In order to prove that $b + d = f$ is the solution, we must now show that it also makes D as small as possible.

But as
$$D = \frac{S}{P}$$

we have only to show that the regularity condition $b + d = f$, makes P either as large as possible, or, which would be still better, a maximum.

Now

$$P = A'' \mu' \lambda'$$

where A'' is the current which enters the line at point 2 (Fig. 2) when Station II is sending alone, while μ' is the factor which determines the loss through leakage of the line, and λ' is the factor to which the magnetic force, exerted by the current $A'' \mu'$ in Station I, is proportional.

μ' as well as λ' are functions of the resistances in Station I only* but not of those in Station II.

Now for constant values of μ' and λ' (i. e. leaving everything in Station I, constant) P becomes larger the larger A'' is:

$$A'' = E'' \frac{b'' + d''}{N''}$$

Substituting its value for N'' , and dividing numerator and denominator by $b'' + d''$, we get

$$A'' = \frac{E''}{f'' + \frac{f''(a'' + h'')}{b'' + d''} + a'' + h'' + c'' \left(1 + \frac{f''}{b'' + d''}\right)}$$

Supposing balance in Station II rigidly fulfilled, we have

$$(b'' + d'') m'' - (a'' + h'' + c'') n'' = 0.$$

$$\therefore c'' = (b'' + d'') \frac{m''}{n''} - (a'' + h'').$$

Substituting this value of c'' in the expression for A'' and reducing, we get

$$A'' = \frac{E'' r'' \sqrt{b''}}{f'' r'' \sqrt{b''} + q'' (b'' + d'' + f'') \sqrt{a''}}$$

* $\mu' = \frac{i}{i + l' + p'}$; $\lambda' = m' + \frac{f'}{f' + l' + d'} n'$

Dividing by q^2 , and putting $\frac{r''}{q^2} = v''$ we have

$$A'' = E'' \frac{v'' \sqrt{b''}}{f'' v'' \sqrt{b''} + (b'' + d'' + f'' \sqrt{a''})}$$

This expression has a maximum* for

$$b'' = f'' + d''$$

which contradicts the regularity condition $f = b + d$ so long as d is different from zero.

Thus, in order to fulfil the regularity condition, and the maximum current, for the differential method simultaneously, we must put up

$$d = 0$$

It has, however, been shewn that in order to have immediate balance, when adjusting balance by a variation in the resistances, we have to alter the resistances of the four branches $b + d$, $a + h$, f , and $w + \beta$ simultaneously according to a relation already given. Thus it is proved that adjustment of balance by an alteration of the resistances must be rejected, since, as pointed out before, a variation of the resistances of the coil b is impracticable.

We are obliged, therefore, to adjust balance by moving the coils or their armatures, and the further solution of the problem is only required, when this mode of adjustment is adopted.

Maximum magnetic moment.

It has now been proved that d is to be made zero, in order to be able to fulfil the conditions of *regularity* and *maximum current* simultaneously; and that therefore, to obtain immediate balance, readjustment of balance is to be effected by a movement of the two coils a and b or their armatures, and *not*, as has been generally proposed, by an alteration of the resistance in the branches $(a + h)$ and $(b + d)$.

Hence h appearing in the denominator of P only, and $h > 0$ not being any more required for adjusting balance, the best value we can give to h is :—

$$h = 0$$

which will make P , obviously largest.†

* In order to keep the balance in Station II rigid when b'' varies we must suppose v'' simultaneously variable with b'' . This is perfectly justified, for v'' can be altered by an appropriate movement of the coils to keep up the balance in Station II, without altering the outgoing current A'' .

† The resistances d and h , without exerting magnetic force, were originally introduced in order to investigate the possibility of adjusting balance by an alteration of the resistances in the branches. But since it has been shown that this mode of adjustment is to be rejected it is of course clear that the dead resistances in these branches should be made zero when P will become largest.

Substituting therefore in the expression for P

$$h = d = 0$$

$$f = w + \beta = b$$

we get

$$P' = \frac{E'}{2(a'' + c'') + b''} \mu' \lambda' \quad \text{for Station I.}$$

and

$$P'' = \frac{E'}{2(a' + c') + b'} \mu'' \lambda'' \quad \text{,, Station II.}$$

These two expressions do not as yet contain the balance conditions.

The factors $\frac{\mu'}{2(a'' + c'') + b''}$ and $\frac{\mu''}{2(a' + c') + b'}$ are identical, namely:—

$$\frac{\mu'}{2(a'' + c'') + b''} = \frac{\mu''}{2(a' + c') + b'} = \frac{i}{Q}$$

$$\text{Where } Q = i \left\{ 2(a' + a'' + l' + l'') + b' + b'' \right\} + \frac{b' b''}{2} \\ + (a'' + l'')(a' + l' + b') + (a' + l')(a'' + l'' + b'')$$

as can be easily calculated by substituting for μ and c their known values.

In the second investigation it has been stated why P' and P'' cannot be made maxima separately, and that we could do nothing else but make their sum a maximum. In this case we have to do the same. Hence the question to be solved is reduced to the following:

$$P = P' + P'' = i \cdot \frac{E' \lambda' + E' \lambda''}{Q}$$

is to be made a maximum with respect to the variables a , b , q and r , while they are linked together by two condition equations, namely:—

$$r'(a' + c') - q'\sqrt{a'b'} = 0 \quad \text{balance in Station I}$$

$$\text{and } r''(a'' + c'') - q''\sqrt{a''b''} = 0 \quad \text{,, ,, II}$$

This general problem can be solved in exactly the same way as it was in the second investigation. It is however not needed to do this again, since the general solution can be written down from inference, after having solved the special problem for a line which is perfect in insulation.

Suppose that $i = \infty$, or at least very large as compared with $l' + l'' = L$, then obviously P' and P'' become identical without condition, namely:—

$$P' = P'' = P = \frac{E}{4} \frac{2q\sqrt{a} + r\sqrt{b}}{L + 2a + b}$$

while the two balance equations become also identical namely:—

$$2q\sqrt{ab} - r(4a + b + 2L) = 0$$

If we substitute the value of r from the balance equation in the expression for P , we get

$$P = E q \cdot \frac{\sqrt{a}}{4a + 2L + b}$$

which has an absolute maximum with respect to a only, namely

$$a = \frac{L}{2} + \frac{b}{4}$$

Substituting this value of a in the last expression for P we get :

$$P = \frac{E q}{4} \cdot \frac{1}{\sqrt{2L + b}}$$

Whence it follows that P becomes largest for $b = 0$, otherwise b remains indeterminate; q on the other hand should be made as large as possible.

If we now put $v = \frac{r}{q}$ and develop its value from the balance equation, we get

$$v = \frac{r}{q} = \frac{1}{2} \sqrt{\frac{b}{2L + b}}$$

The solution of the 1st problem of the differential method, when the line is perfect in insulation, is therefore

$$h = d = 0$$

$$f = b = w + \beta$$

$$a = \frac{L}{2} + \frac{b}{4}$$

$$v = \frac{1}{2} \sqrt{\frac{b}{2L + b}}$$

The absolute value of b is left indeterminate,* and we only know that the smaller it can be made the better.

But to fulfil this best condition $f = b = w + \beta = 0$ represents a physical impossibility, since neither β , the internal resistance of constant galvanic cells, can be made zero, not even approximately, nor b , which must have convolutions in order to act magnetically.

The larger $f = b = w + \beta$ becomes, for practical reasons, the more the differential method, even under the best quantitative arrangements as given above, will become inefficient as compared with the double balance.

* Practically, however, it may be said, that b is given; for generally β , the internal resistance of the signalling battery is determined by the nature and number of galvanic cells required for duplex working. We must only remember that b should be made somewhat larger than β , in order to have an adjustable resistance w in the battery branch, which may be used for compensating any variation of the battery resistance, that the equation $f = b = w + \beta$ may be permanently fulfilled.

Now by inference we get for a line with leakage, *i. e.*, $i < \infty$

$$\left. \begin{aligned} a' &= \frac{L'}{2} + \frac{b'}{4} \\ a'' &= \frac{L''}{2} + \frac{b''}{4} \\ v' &= \frac{1}{2} \sqrt{\frac{b'}{2L' + b'}} \\ v'' &= \frac{1}{2} \sqrt{\frac{b''}{2L'' + b''}} \end{aligned} \right\} \text{Approximately.}$$

The above values for a and v are somewhat too large, but in practical application they are quite correct enough.

The physical reason that this solution for the differential method gives an indeterminate result, is simply due to the fact that the force which produces the signals in the differential method is due to the combined magnetic actions of *two* separate coils through which unequal currents pass, instead of to *one* coil, as in the bridge method. On account of $b = f$, it follows that the current which passes through the b coil is only half of that passing through the a coil. Thus, in order to make the most of the arrived currents, b and f should be both equal to zero, or, in other words, placing *all* the convolutions in a and *none* in b must clearly give the greatest magnetic force. Obviously, however, such a solution could not fulfil the balance condition in the sending station.

The value of b should be chosen as small as practicable and its minimum value is β , the internal resistance of the signalling battery. How much larger b should be taken, depends on the absolute variation of β , *i. e.*, on the constancy of the resistance of the signalling battery. If the battery is very constant with respect to internal resistance, then b need be only very little larger than β , which determines the adjustable resistance w .

For instance minotto cells can be easily prepared with an internal resistance of 10 B. A. U. per single cell. Their minimum resistance, obtained by working, is never less than 5 B. A. U., and if the zincs are changed from time to time, their maximum resistance will scarcely ever be higher than 10 B. A. U.

Hence to make b about 50% larger than β will suffice, by which, if β is known, the greatest value of w is fixed.

The absolute value of β can be determined from the number of cells which have to be connected up successively, in order to work a given instrument through a given line, when the circuit Fig. 2 is adopted. This absolute value of β will therefore not only depend on the electrical state of the line and the nature of the cells, but also on the absolute sensitiveness of the differential instrument employed.

To make β therefore as small as possible, a sensitive construction of the differential instrument becomes requisite; further cells of high E. M. F. and low constant resistance are best adapted for forming the signalling battery. In order to get the widest limits in the variation of w it is clear that *that* β should be selected which is calculated from the maximum number of cells required to produce the signals with sufficient force. The greatest number of cells is obviously required when the line is at its lowest insulation, in India during the monsoon.

The value $v = \frac{r}{q}$ is what has been termed the mechanical arrangement of the differential instrument.*

If $b = w + \beta$ has been determined by fixing β , then v has its smallest value for L largest, which is the case when the line is perfect in insulation; when the coil a must be closest to the magnetic pole acted upon, and the coil b furthest away from it.

The highest value of v we obtain by substituting the lowest L , *i. e.* when the line is at its lowest insulation; when the coil b must be nearest to the magnetic point acted upon, and the coil a furthest away from it.

Hence the two limits of v being fixed by the known limits between which L varies, the extent of movement of the two coils is also fixed, and consequently, if q is chosen arbitrarily, the construction of the differential instrument is determined. But even q is not quite arbitrary, since we know the form, dimensions and resistance of the coils, which, for instance, in Siemens' polarized relays on any given line, have to produce the magnetism in single circuit to get the signals with engineering safety.

The solution of the 1st problem of the differential method is therefore:

1. Balance in each station must be obtained by a movement of the two acting coils or their armatures, either singly or better simultaneously in the same direction, and *not* by an alteration of the resistances in the branches.

2. If this mode of adjusting balance be adopted, then the solution is:

$$d = h = 0$$

$$f = b = w + \beta$$

$$a = \frac{L}{2} + \frac{b}{4}$$

$$v = \frac{r}{q} = \frac{1}{2} \sqrt{\frac{b}{2L + b}}$$

It will now be clear that the given solution fulfils the following essential conditions:

* J. A. S. B., Vol. XLI, Pt. II, p. 148.
Phil. Mag., Vol. XLIV, p. 166.

- (i). Any variation of the resistance in the total system has the least possible disturbing effect on the receiving instrument.
- (ii). Any disturbance of balance can be eliminated by an appropriate movement of the two acting coils or their armatures, without disturbing balance in the distant station.
- (iii). Conditional maximum magnetic moment of the receiving instrument.
- (iv). Conditional maximum current.

ADDENDUM I.

Here I wish to give some additional explanations and corrections with reference to the 1st and 2nd parts of this investigation.

In J. A. S. B., Vol. XLIII, 1874, Pt. II, p. 20, I have substituted

$$c' = L' + \rho''$$

without stating that this expression for c' is only approximately true. The correct expression for c' is clearly

$$c' = l' + \frac{i(l'' + \rho'')}{i + l'' + \rho''}$$

which approximates closely towards $L' + \rho''$ if $l'' + \rho''$ is sufficiently small as compared with i . This for any line in good electrical condition, will always be the case.

At page 9, in the foot note, for "*as nearly as possible equal*" read "*as nearly as possible proportional*."

At page 20, $\frac{dG}{dg} = L(a^2 - g^2) + 2ag(d - g) = 0$

should be $\frac{dG}{dg} = L(a^2 - g^2) + 2a(ad - g^2) = 0$

At pages 19 and 224 after having shewn that

$$a + f = g + d$$

I conclude at once that on account of equation VI ($ad - gf = 0$)

$$a = g = d = f \quad \dots \quad \dots \quad \dots \quad \text{VIII}$$

while mathematically it follows only that

$$a = g$$

and

$$d = f$$

These two equalities do certainly not contradict equation VIII but they do not necessitate it.

The additional reason why equation VIII should be chosen follows from the balance condition

$$ad - bc = 0$$

$$\therefore b = \frac{ad}{c}$$

Therefore b becomes largest for any given e and any given $(a + d)$, if we put $a = d$.

But b largest is required for two separate reasons :

1. If the immediate balance is disturbed by an alteration of the resistance of one or more of the four branches, which may happen, especially by f , *i. e.*, β (battery resistance) varying, then ρ becomes at once a function of b , *i. e.*, an increasing one with b . Thus in order to keep ρ as large as possible, and at the same time as constant as possible, b should be selected largest.

2. Further by making b as large as the circumstances will admit, we clearly have the largest sent and largest received currents, which will be clear without calculation. In fact later on, page 232, it has been shewn that $a = d$ is the condition for the maximum signalling current.

ADDENDUM II.

Since the 3rd February, 1875, the main line from Bombay to Madras had been successfully worked duplicé by means of the "double balance method."

This line is worked direct, *i. e.*, without any translating instruments, and is 797 miles in length ; it consists almost throughout of No. 5½ wire B. W. G. (diameter 5½ m. m.) and is supported chiefly on the Prussian insulator.

The section of this line from Bombay to Callian is exposed to the destructive influence of a tropical sea climate ; between Callian and Poona the line passes over the Western Gháts, the dense fogs during the cold weather and the heavy rains during the South-west monsoon on these hills seriously affect its insulation ; from Poona to Sholapore and Bellary, the line runs inland and experiences a climate on the whole favourable for the maintenance of constant and high insulation ; between Bellary and Madras, however, the line again comes under the influence of a most unfavourable climate, especially just before and during the continuation of the North-east monsoon, when the atmosphere at a high temperature, is saturated with moisture and salt, leaving conducting deposits on the surface of the insulators.

Consequently during the South-west monsoon the resultant fault is near Bombay, during the hot weather it shifts towards the middle of the line, and in November when the rains set in at Madras and the weather on the Bombay side is clearing up, the resultant fault is situated close to Madras.

By February next, duplex working will therefore have been submitted to a most severe test, applied as it will have been for a whole year to a long line the electrical condition of which is highly variable with respect to season and locality, and its practicability will doubtless again be clearly proved, as has already been the case on the Calcutta-Bombay line, 1600 miles, where under no more favourable climatic conditions, duplex has, for the past twelve months not only fulfilled but surpassed the expectations formed of it. No difficulties have been experienced, and it is believed never will be.

Strange as it may appear from a theoretical point of view, it will nevertheless be found in practice, that a line worked dupli^{cé} carries more than double the traffic of the same line worked singly; for it represents two lines carried on different posts far distant from one another, instead of 2 parallel lines on the same posts, and consequently the highly injurious effects of voltaic induction are eliminated.

Further the receiving signallers, not being provided with keys, are unable to interfere with messages during their transmission.

Corrections and repetitions do not necessitate a stoppage of work, for they are obtained in the following manner: the receiving signaller marks with a cross, or underlines the words to be repeated, and places the message by the side of the sending signaller, who calls for the repetitions directly he has finished the message he is transmitting, and during this call the distant station may either send fresh messages or may also call for repetitions; consequently single working need never be resorted to, and the simultaneous exchange of messages and corrections becomes continuous.

The Indian system of receiving (the sounder system which has now been universally recognised as the only right one hand for signalling) thus necessitates constant attention on the part of the receiving signallers, for any inattention on their part at once becomes known to the controlling officer.



X.—*Photography in connection with the Observation of the Transit of Venus at Roorkee, December 9th (Civil), 1874.—By Captain J. WATERHOUSE, Assistant Surveyor General of India.*

(Received July 30th ;—Read August 4th, 1875.)

In December last I communicated to the Society a brief account of the proposed arrangements for observing the Transit of Venus at Roorkee, drawn up by Capt. W. M. Campbell, R. E., and although the popular interest in the subject has now somewhat worn off, a description of the operations connected with the application of photography to the observation in India of this very important astronomical event may not be without interest to the members of the Society, and as a record of experience gained, be useful on a future occasion.

Object of Photographic Observations.—Without entering into the consideration of the astronomical problems involved, it may be briefly stated that the object in view in making photographic observations of the Transit of Venus was to obtain a series of images showing, with the utmost attainable accuracy, the exact relative positions of the planet and the sun at carefully noted times during the progress of the Transit at the different stations of observation; so that by combining these photographs, the path of the planet across the solar disc might be accurately determined and the solar parallax be estimated by comparing the paths thus deduced for different stations. It was further proposed to endeavour to secure a graphic time-record of the exact moments at which the internal contacts of the planet and the limb of the sun took place, by means of an arrangement enabling a large number of photographic pictures to be taken on a single plate at intervals of a second or so just about the time of contact. It was anticipated that results of the highest possible value and reliability would be obtained if photographs sufficiently exact to allow of minute micrometrical measurement could be secured, as such photographs would form a permanent and indisputable record, entirely free from the errors and imperfections inseparable from personal observation, and have the further advantage that they might be examined at leisure and, if necessary, carefully compared by several independent examiners. How far these anticipations have been fulfilled still remains to be seen; but as several hundred photographs have been obtained in various parts of the world by different photographic processes and with dissimilar instruments, sufficient data will probably have been gained to test the value of photography for observations of so delicate a nature and, if this is satisfactorily proved, to show by what methods it may most successfully be applied.

The superintendence of the official arrangements for the observation of the Transit in Northern India was entrusted to Colonel Tennant, R. E., who has done so much to further the progress of astronomy and solar physics in this country, and was one of the first to recognise the value of photography as a means of recording the Transit. He selected Roorkee in the N. W. Provinces as his station of observation, partly on account of the great advantages to be gained by the proximity of the Canal Workshops for setting up the observatory and the repair and adjustment of instruments.

Photoheliograph.—It was arranged that photographic observations should form part of Colonel Tennant's programme and that with this object he should be furnished with a photoheliograph by Dallmeyer, of the same construction as those supplied to the English and Russian expeditions. These instruments were on the same principle as the photoheliograph designed by Dr. Warren De la Rue for the Kew Observatory, and consisted of a telescope combined with a photographic camera, equatorially mounted, and driven by clockwork. According to a description given by the maker, the object glass was 4 in. diameter and 60 in. focal length, corrected to combine the chemical and visual foci. The image of the sun formed at the principal focus was about $\frac{1}{2}$ in. in diameter and was thrown on to an enlarging combination by which an enlarged image about 4 in. diameter was projected on to the sensitive photographic plate arranged as in an ordinary camera. A little in front of the enlarging lens was a slide pierced with two circular openings, one fitted with spider-web crosslines and the other with a glass plate ruled with a fine reticule of squares, and capable of adjustment so as to be brought into the focus of the object-glass in order that the cross-wires and reticule might be enlarged and brought to fine focus at the same time as the image of the sun. The pictures could thus be taken with the cross-wires, which served as a reference mark for measurements in connection with the declination and right ascension circles, or with the reticule, by means of which any optical distortion caused by the secondary enlargement of the image could be measured.

The quick exposure of the plates was effected by means of a shutter sliding between the cross-wires and the enlarging lens, in which position the object could be effected with a minimum of motion. This shutter was held at its lower end by a spring and was arranged so that when raised to its full extent, by means of a string attached to its upper end, the passage of the solar rays to the sensitive plate was cut off. This string passed over a pulley on the body of the instrument and had at the end a hook on which a loop of strong cotton thread was attached and, being stretched so as to pass over a conical block fixed on the camera, retained the shutter in its raised position. When the thread was cut, the force of the spring imme-

diately drew down the shutter and allowed a momentary exposure of the sensitive plate to the solar rays during the passage of a slit in the shutter, the width of which could be increased or diminished at will from nil to $\cdot 5$ of an inch by means of another slide worked by a screw connected with a graduated scale. The rapidity of motion of the shutter could also be regulated by increasing or diminishing the tension of the spring by means of a screw.

When the shutter was down the solar rays were quite cut off; but by a simple arrangement a circular aperture above the exposing slot could be brought into a position concentric with the axis of the telescope, thus permitting the whole bundle of rays to pass uninterruptedly through the camera and enabling the image to be examined for focussing, &c.

The camera of the photoheliograph was constructed to take plates six inches square. The position of the image on the plates was regulated by means of a finder fixed on the outside of the telescope tube and consisting of a lens throwing an image of the sun upon a screen made of talc covered with paper, and adjusted so that when the enlarged image was in its proper position on the ground glass of the camera the finder image just filled a square ruled on the talc screen.*

Janssen Slide.—A repeating arrangement for taking several pictures on one plate, designed by Dr. Warren De la Rue on the principle proposed by the eminent French astronomer M. Janssen, and known as the Janssen slide, also formed part of the equipment. This arrangement having been fully described and figured by Dr. De la Rue,† it will suffice to say that it consists of a circular wooden case about 12 in. in diameter and 2 in. deep, with a removable shutter in front and constructed so as to be fitted on to the camera in the position occupied by an ordinary dark slide. Revolving on a central axis within this case is a metal disc or plate-holder, with 60 radial slots and as many circular spaces racked in its edge, carrying the sensitive plate held between rings strongly electroplated with silver. Outside the case, in front, a second smaller disc revolves just outside the shutter and is provided with a radial opening capable of being opened or closed at pleasure, so as to regulate the exposure by admitting more or less light to the plate through a radial slit cut in the shutter of the slide, about 1 in. long and exactly corresponding in position and width to the sixtieth part of the circumference of the plate. The axis of this exposing disc passes through the case and carries a pin which fits into the slots in the edge of the revolving plate-holder and is turned, from outside the case, by means of a winch arranged with gearing, so that it may be

* The screen originally supplied with the instrument was of parchment, but as this was found to expand and contract with the variations of moisture in the air, it was advantageously replaced by the talc and paper screen.

† Roy. Ast. Soc. Monthly Notices, May 1874.

worked either by hand or automatically by means of clockwork. This axis also carries an ivory ring on the periphery of which is fixed a piece of platinum wire which, as the axis revolves, comes into contact with a strip of platinum fixed on a spring attached to a connector, so that it may be placed in electrical communication with a chronograph and electric clock and thus enable the precise moment to be recorded, when the uncovering of the aperture in the shutter of the slide by the exposing disc exposes a portion of the plate to the sun. As there are sixty slots and the aperture corresponds to the sixtieth part of the circumference of the plate, it is evident that for each entire revolution of the plate-holder sixty distinct images will be impressed on as many separate portions of the plate within an annular space about 1 in. wide round its circumference.

The apparatus is constructed so that the plane of the sensitive collodion film shall exactly coincide with that of the focussing screen of the camera, and in order to adjust the instrument so as to obtain an image of any desired portion of the solar limb or disc, it is arranged that when the sensitive plate is in the proper position for receiving the first image of the sixty, the observer can look from behind, through a series of three red glasses, one of which is in front of the plate, on the exposing disc, and the other two behind it, one on the revolving plate-holder and the other on the wooden case. The three glasses are coincident only in one position, *i. e.*, when the stop, formed by racking the last of the radial slots for only a short distance, is on the right of the axis; and as the stop is on the left of the axis after a complete revolution, the revolving plate-holder must always be reversed through an entire revolution after each operation in order to bring it into the proper position for focussing. While focussing, the sensitive plate itself acts as a focussing screen.

By means of clockwork the rate of revolution of the plate-holder could be so adjusted that the exposures might be made at intervals varying from about half a second to two seconds, but as it was desirable not to expose the separate pictures too rapidly, the rate was set so that the entire revolution might be accomplished in about a minute and a half.

Preliminary trials with Dry Plates.—I received intimation about the middle of August 1874 that, with the concurrence of the Surveyor General, my services were likely to be placed at Colonel Tennant's disposal for the superintendence of the photographic observations. As there appeared to be a general opinion in Europe that a dry process would be most suitable for continuous observations lasting over a period of some hours and would have other special advantages for the purpose, the first thing to be done was to select the process to be used and to gain some experience in working it; and although the weather at that time of the year was most unfavorable to photography and very trying to work in, all the time that could be

spared from my regular office duties was devoted to preliminary trials of dry plates in Calcutta till October, when I joined Colonel Tennant at Roorkee.

It was understood that the English observers were to use the beer-albumen dry process recommended by Captain Abney, R. E., and therefore my first trials were with it; but although the instructions given by Captain Abney were carefully carried out, it was found impossible to obtain the exalted sensitiveness claimed for the plates and, though the pictures obtained had many good qualities, the exposures were so long that I could not but consider the process unsuitable and look for some other by which more sensitive plates could be secured. The beer-albumen process was, however, tried on several different occasions, both in Calcutta and at Roorkee, with different collodions and various samples of beer, but always with the same result.

The cause of the great want of sensitiveness shewn by these plates could not be discovered. Captain Abney says that those who have not succeeded with his process have not used a sufficiently porous collodion; but on this occasion several collodions were used, some containing a large proportion of water, but without any noticeable advantage; though other dry plates taken with the same collodions gave much greater sensitiveness.*

It is possible that the beer used was not quite suitable from containing too large a quantity of chlorides or other substances detrimental to sensitiveness, and that this was probably the case is shown by the fact that a much greater sensitiveness and generally better results were obtained with the mode of working the beer-albumen process recommended by Mr. Davies of Edinburgh, in which a small quantity of nitrate of silver is added to the beer with the effect of throwing down all the chlorides and much of a glutinous substance; but even this modification did not give quite satisfactory results and the idea of using the beer-albumen process for the Transit plates was given up. Although the process has no doubt yielded excellent results in the skilled hands of Captain Abney and others, the uncertain composition of the different liquids known as beer render it undesirable that this substance should be used in the preparation of dry plates which are to serve as a standard for scientific purposes and from which comparable results are expected. For such purposes more certainty and

* I have quite recently tried the beer-albumen process again with samples of collodion yielding good results with other dry processes—but found the plates just as insensitive as they were before. By flowing the films, after washing away the free silver, with a 10-grain solution of pyrogallie acid in beer, then again well washing, and finally flowing the plate with a mixture of glycerine and dilute albumen, plates were obtained giving excellent results with at least ten times more sensitiveness than those prepared by Captain Abney's plan.

uniformity will be attained by the use of materials which are likely to be of nearly the same chemical composition in all parts of the world.

As the beer-albumen process was not found to answer, attention was turned to other dry processes and several different methods were tried with varying results.

At an early stage of the experiments it was found from trials with a rough photoheliograph, constructed in Calcutta for the purpose, that a process which might give very good results for taking views &c. would not answer for the sun and *vice versa*; and the same was afterwards found to be the case when working with the English photoheliograph.

Among the most promising dry processes tried in these preliminary experiments were the gum-gallic, in which the so-called preservative is composed of a solution of gum arabic and gallic acid, and a process in which the preservative was laudanum, either alone, as a dilute solution in water containing from 16 to 4 per cent. of laudanum, or mixed with gum arabic or gum tragacanth, in order to keep the pictures free from the stains liable to occur when using the laudanum alone. Excellent results for views were also obtained with a filtered mixture of laudanum and very thin arrowroot water. I was induced to use the laudanum from a statement of Prof. Vogel of Berlin, that plates prepared with morphia were more sensitive to the comparatively nonactinic rays from the outer part of the solar disc; and though I did not remark any special superiority in this respect, the laudanum plates were found more sensitive than most of the others tried. Plates prepared with a saturated solution of morphia in water also gave good results.

The addition of nitrate of uranium to the nitrate of silver bath used for sensitising the plates, as recommended by Captain Abney, was found advantageous for most of the dry plates, giving increased sensitiveness and other good qualities. As some doubt has lately been thrown on the advantage of the uranium bath, it may be as well to state that in the ordinary wet process with bromo-iodised collodion I have found that no advantage is gained by the addition of the uranium salt to the nitrate bath, but, on the contrary, there is a great loss of sensitiveness. With dry plates, however, it is different, the gain in sensitiveness is well-marked and the shadows appear cleaner than on plates sensitised in the ordinary bath without the uranium.

Shrinkage of the Collodion films.—When it was first proposed to employ photography in observing the Transit, it was objected that the collodion processes would be unsuitable on account of the shrinkage or contraction the collodion films undergo in drying. De la Rue in 1861 made some very careful experiments, the result of which was to shew that with proper precautions the shrinkage was entirely in the thickness of

the collodion film: more recently, however, Paschen had found this contraction to amount to not less than $\frac{1}{1856}$ of the length of the plate, with albumenised plates, and to $\frac{1}{2128}$ of unalbumenised plates; in one instance it being so much as $\frac{1}{2128}$ of the length and $\frac{1}{618}$ of the breadth of the albumenised plate. Rutherford, on the other hand, found that if the plates received a preliminary coating of albumen, the shrinkage of the wet film in drying did not exceed $\frac{1}{8888}$ and was, on an average, about five times less. Prof. H. Vogel, of Berlin, also made some experiments on the conditions affecting the stability of the collodion film, which proved the value of a substratum as a preventive of contraction of the film and shewed that dry plates were less liable to contraction than wet. Captain Abney and Colonel Stuart Wortley, when experimenting on a dry process to be used for the transit by the English expeditions, also gave this subject their careful consideration and came to the conclusion that with proper precautions the amount of shrinkage would be so small as to be negligible. Notwithstanding this concurrence of testimony as to the possibility of disregarding the contraction of the film, I thought it desirable to satisfy myself as to the suitability in this respect of the various dry processes I was trying, and the plates were therefore tested by a method which I afterwards found was somewhat similar to that followed by Dr. De la Rue, and appeared to have the advantage of entirely avoiding any chance of error from parallax caused by want of absolute contact between the test lines and the collodion film. Several glass plates five inches square were prepared by drawing on them, with a very fine diamond point, diagonal lines through the corners of the plates. With the intersection of the diagonals as a centre, a circle was described 4 in. in diameter, so that it might correspond in size with the solar disc on the plates to be taken during the Transit. These test plates were then coated with the usual albumen substratum and prepared exactly in the same way as the dry plates under trial. They were exposed to light from the back, so that an impression of the engraved lines was obtained through the film. The plates were then developed in the same way as the other plates and when dry, examined under a very powerful micrometer capable of dividing to the $\frac{1}{100000}$ of an inch. To facilitate the examination, a piece of the film was cut away across the lines in different parts of the plate, and the course of the uncovered part of the line compared with the covered part. In no case was any perceptible difference found, except when the substratum had been purposely omitted, or processes used which gave rise to blistering of the film. The only chance of error I could see in this plan was the sticking of the film to the rough surface of the engraved lines; but in the cases where the film blistered it was found that the blistering was more marked on the lines than elsewhere, and so it would appear that the lines did not exert any particular influence on the free motion of the film. I had not

time to go into the subject very thoroughly nor the means of trying other tests.

Arrangements of the Observatory.—I arrived at Roorkee on the 13th October and thus had about eight weeks for preparation. Colonel Tennant had built an observatory with domes for all the observing instruments and had allotted to me a very convenient dark room about ten feet square, attached to the dome in which the photoheliograph had been erected and separated from it by a narrow passage about 7 feet long and 3 feet wide. I had doors placed at each end of this passage, so that communication could pass between the dome and the dark room without letting light into the latter; and in order to avoid the necessity of constantly opening the doors for the passage of the dark slides to and fro, a sort of box opening at both ends and large enough to hold a dark slide was let into the panelling of each of the doors, and the dark slides were thus easily passed backwards and forwards without any risk of letting in light or raising of dust. Double doors were also constructed at the entrance to provide for communication from outside without interruption of the work going on within. Tables and shelves were arranged in the dark room so as to keep all the operations and the necessary chemicals and appliances for each quite distinct; thus there was a table for the nitrate baths and near it, shelves for the collodions and plate boxes. Another table with sink, was set apart for developing and close by, were shelves for the developers and chemicals &c. used for developing. A third table was used for changing dry plates and above it were shelves for the dry plate boxes. Some such system was absolutely necessary in such important operations, and the principle of a place for every thing and every thing in its place was rigidly adhered to.

As it was undesirable to use the dark room in the observatory for the preparation of plates and chemicals or as a store room, nothing was kept in it except the chemicals and apparatus actually required there. A dark room for the preparation of dry plates, testing baths, &c., was fitted up in a house immediately opposite the observatory, and here also all mixing of chemicals, cleaning plates, and other preparatory work was carried on and spare stores kept.

The photoheliograph had been erected by Colonel Tennant before my arrival on an isolated brick pillar in the centre of a circular room 12 feet in diameter, fitted with a revolving observatory dome.

It was arranged that the times at which the several photographs were exposed should be recorded by electricity on a chronograph placed in an adjoining room in electric communication with the standard clock, which also gave the time to a clock-dial placed in the dome.



This was effected by the use of a tappet or make-circuit key, to which Colonel Tennant had very ingeniously fitted a pair of scissors so that the act of cutting the thread to let loose the exposing shutter of the photoheliograph, completed the circuit and the exact time of exposure was thus instantaneously recorded on the chronograph. The Janssen slide was also fitted with arrangements for being placed in electric communication with the chronograph, so that every turn of the winch was recorded at the moment of exposing each picture round the circumference of the plate.

The staff of assistants at my disposal included three European assistant-photographers, Sergeant J. Harrold, R. E., of the Photographic Branch Surveyor General's Office, Calcutta, Lance-Corporal George and Private Fox, of H. M.'s 55th Regiment, who had been thoroughly trained by Colonel Tennant in the ordinary manipulations of the wet collodion process, with three native servants for handing the plates to and fro and performing other menial duties.

Preparatory Work and Drills.—One of the first things to be done before beginning the drills was to examine the whole stock of glass and carefully select about 200 of the best and most free from flaws, which were carefully set aside to be used for the Transit.

The dry plate trials were resumed with the advantage of having a suitable instrument to work with. The beer-albumen and other processes that had been found more promising in Calcutta were tried again, but were found not quite satisfactory with the sun; the tea and coffee processes, which I had not tried in Calcutta, were better and I finally adopted a modification of the coffee process recommended by M. Constant of Lausaune, substituting albumen for gum to avoid the tendency to blistering so common when using gum, and also with the view of lessening photographic irradiation, against which the coffee proved a further protection. These plates were easily prepared and were found fairly sensitive, easily intensified, perfectly clear and free from blurring in the shadows.

The glass plates, having received a thin coating of albumen as a substratum, were coated with collodion and sensitised by a somewhat prolonged immersion in a 40-grain silver bath, then washed in four changes of distilled water and finally immersed in a resensitizing solution, or so-called preservative, composed of

Dried albumen	2 grammes
Sugar	12 "
Coffee infusion made by boiling 30 grammes of coffee in 360 C. C. of water	300 cub. cents.
Water.....	300 " "

and then drained and dried without heat.

As soon as arrangements were sufficiently advanced, preliminary drills were commenced with the object of finding out the best mode of working, in the event of dry plates being used, and after a few trials, it was arranged that instead of developing every twelfth dry plate, as proposed by the English observers, every fifth plate should be prepared by the wet process and developed at once to ascertain if all the adjustments were correct, the necessary alterations in the exposure of the plates being arranged by trials beforehand.

From some cause all the dry plates prepared at Roorkee were covered with spots, some transparent, others opaque and comet-like, and as it was impossible to trace the cause of these spots or to avoid them, even with the most careful precautions, trials were made, about the 17th November, to ascertain if the ordinary wet process could be used instead and, after working a few days, it was found that there was no difficulty in keeping a regular supply of plates every two minutes by the use of four sensitising baths. The superior convenience of working by the wet-plate system and the great saving of time and trouble that would be gained became so manifest that it was definitely decided to adopt it and thenceforth the wet plate drills were carried on daily between the hours of 7 and 12, during which the Transit would take place; as a rule in the early morning and forenoon, alternately, sometimes twice during the same day. Particular attention was given to practising the mounting of the Janssen slide by signal and again unmounting it and resuming the ordinary plates in the interval.

Although the use of dry plates was said to possess the great advantage of enabling irradiation to be much diminished by the use of albumen in the re-sensitizer and also in reducing the shrinkage of the film to a minimum; as well as great convenience in preparing and developing the plates at leisure free from excitement or hurry, and in facilitating the working of a large number of plates with a small staff of assistants, the substitution of the wet process had many advantages in avoiding the very tedious operations of preparing and developing so large a number of plates, which alone would have taken up about two days before and after the Transit, and more particularly in enabling the state of the work to be seen throughout the Transit and any necessary alterations to be carried out immediately. The manipulations of the wet process were perfectly familiar to all my assistants and by a division of labour they were able to carry on the work with ease and without the slightest confusion.

By giving the films a substratum I hoped to avoid any shrinkage of the collodion in drying and by placing pieces of wet red blotting paper behind the plates to lessen the tendency to irradiation.

My programme of operations having been drawn up and approved by Colonel Tennant, the first rehearsal took place on the 28th November with tolerable success, and several points were noticed as requiring modification.

After further practice, a second full rehearsal took place on the 2nd December, and a final one on the 6th, which was very successful; 120 six-inch plates with 6 Janssens being exposed in the course of the time the Transit was calculated to last.

The preparations for the Transit itself, such as numbering and cleaning glasses, preparing and testing baths, and examining the minor adjustments of the instruments were commenced about a week beforehand.

Unfortunately the weather for a few days before the Transit was very cloudy and most unfavorable for trials of chemicals and testing the focal adjustments of the instrument, which caused some trouble and uncertainty.

Although it was determined to adopt the wet process entirely for the Transit plates it was considered desirable to have a small supply of dry plates prepared in reserve in case of accidents and to be used, if necessary, at times when the supply of wet plates could not readily be kept up. About a dozen of the six-inch and four of the Janssen plates were therefore prepared by the coffee-albumen process, already described, using a highly bromized collodion recommended by Captain Abney for sun pictures, which gave an intense picture with considerable sensitive-ness; but owing to the short time between receiving the materials from England and their being used this collodion had scarcely time to ripen properly, and so could not have a fair trial. Captain Abney's formula was—

Thomas' bromized collodion.....	20 oz.
„ iodized „	20 „
Alcohol s. g., 805.....	6 to 8 „
Pyroxyline	300 grs.
Water	120 min.

The plates were developed with the strong alkaline developer recommended by Captain Abney.

One of these Janssen plates and four of the six-inch plates were used during the Transit and, with the exception of the spots, were excellent pictures, fairly sharp and dense, free from blurring, and, in some respects, better than many of the wet plates.

Several days before the Transit 120 six-inch glasses were selected from those set aside as the best and were numbered with a diamond in one corner consecutively from 1 to 120. A reserve of about 30 plates was also selected and marked with a cross in one corner. The whole of these plates as well as a dozen of the best circular Janssen plates were then carefully cleaned and coated, on the unmarked side, with an albumen substratum, consisting of the white of one egg and about one drachm of ammonia to a wine-bottle of water, in order to prevent any rising of the film and consequent liability to shrinkage. The plates thus numbered and albumenised were arranged in order in five boxes, hold-

ing two dozen each, with the marked corners running along the upper left hand side of the boxes. Each box was then legibly marked with a distinguishing letter and the numbers of the plates contained in it thus

A
1-24. A sixth box containing marked plates was kept in reserve to be used

if required, and it was arranged that any plates so used were to be numbered at the time of use with their proper number in order of sequence.

It was also carefully enjoined on the assistants that the utmost care was to be taken to preserve the proper order of sequence of the plates throughout the operations, but that if, by accident, a plate should be left out or any alteration in sequence occur, the officer in charge should be at once informed of it and duly record it. Should any of the plates originally numbered be broken during any of the operations or put aside from any other cause, their places were to be filled up from the marked plates and they were to be numbered in their proper order of sequence.

Arrangements were made for providing four nitrate of silver baths of suitable size for sensitising the six-inch plates and a larger one for the Janssen plates; besides these, two small baths and one large one were kept ready in reserve in case of one of the other baths getting out of order or becoming temporarily unfit for use. The baths used were new and about 45 grains to the ounce (10·2 per cent.).

The collodion used was prepared according to a formula given me by Colonel Tennant as follows:—

Cadmium Iodide,	1	gramme.
Cadmium Bromide,.....	1	„
Ammonium Iodide,.....	1	„
Pyroxyline,	4	„
Ether,	110	cub. cents.
Alcohol,	110	„ „

This collodion contained a large proportion of pyroxyline and haloid salts and was selected because it was found to give more density of the film and intensity of image than the ordinary commercial samples. Two pints of it were carefully cleared for use during the Transit.

A reserve supply of a mixture of Thomas' and Rouch's was also used for some of the plates. It was arranged that the collodion should only be used once, so that each plate might be coated with fresh collodion, thus preserving the uniformity of the films and keeping the collodion free from impurities.

An ample supply of developer was also prepared by the following formula:—

Protosulphate of Iron.....	55	grammes
Sugar	55	„

Glacial Acetic acid	40	cub. cents.
Spirits of Wine.....	30	" "
Water	1000	" "

A solution of cyanide of potassium was used for fixing.

It was considered advisable not to intensify the plates, but to obtain the greatest possible intensity from the first development.

As the plates were developed they were placed in a draining rack in order as taken and put aside till after the Transit.

The distribution of duties was arranged as follows:—

I remained at the Photoheliograph to expose the plates at every two minutes and record the times of exposing each plate by the clock dial, which had previously been ascertained to agree with the standard clock, carefully noting any variation in the intervals and any other noteworthy circumstance connected with any of the plates. At every sixth plate, with a few exceptions, the cross-wires were replaced by the reticule.

Sergt. Harrold developed the plates and generally supervised the operations in the dark-room. He was directed to take special care that the plates were arranged in the racks in their proper order of sequence as developed, and to note in writing any variations. He was at once to inform me of any defects in exposure or in the position of the image on the plate.

Corporal George coated the plates with collodion and sensitised them. He was responsible that the plates were taken in the proper order, as numbered and arranged in the boxes, and was ordered to at once report any change. In case of having to pass over any of the marked and numbered plates, he was to properly number the plates substituted for them. In order that the position of the sun's image might be the same on all the plates, he was ordered when coating the plates with collodion to keep the unnumbered side of the plate uppermost, with the numbered corner away from him on his right hand, pouring off the collodion at the near right-hand corner.

Private Fox took the plates out of the baths and placed them in the slide so that the numbers might be at the upper left-hand corner of the slides and the thick collodion at the lower left-hand corner. (This arrangement of the plates when being coated and placed in the slides was observed throughout all drills and practice plates, and answered the purpose perfectly.) He then placed the dark slides in the receptacle in the door from which they were passed into the dome by the man in the passage between the doors. It was also his duty to carry the Janssen slide into the dome, place on and take off the No. 1 counterpoise, which was fixed at the end of the declination axis, and carry the Janssen plates back again for development. In case of there being any delay in a wet plate being ready at the proper time, he was to keep a dry plate in readiness to be sent in instead, notify-

ing the change, and this he was ordered to do at all changes from wet to dry and *vice versa*.

In order to prevent mistakes and confusion in communicating between the dome and the dark room, it was arranged that all communications should be in writing; supplies of slips of paper with a pencil attached were kept in a convenient position in different parts of the dark room and the dome, and were passed to and fro through the slides in the doors without noise or disturbance of the operations.

Of the three native servants, one remained in the dark room to hand the dark slides backwards and forwards, but when the Janssen slide was used he went into the dome to put on the No. 2 counterpoise, at the object glass end of the telescope; another man remained in the space between the double doors and passed the dark slides in and out through the slides in the doors. The third stood in the dome to hand me the dark slides, hold the loops of thread and hook them on the string attached to the exposing shutter, turn the dome, and give me any other assistance I required.

Corporal George and Private Fox took it in turns to act as orderly of the week and their duties were to open the dome for work, have the water boxes filled at the proper times, uncover the instrument, see that the necessary chemicals and glasses were ready in their places for use, and after work, to have the rooms cleaned, the instrument dusted, and the dome closed.

Two or three days before the Transit I examined all the adjustments of the sliding shutters and the electrical communications and satisfied myself that all were in good order.

As the weather had been cloudy two or three days before the Transit there was some uncertainty as to whether it would be fine or not, but, in the event of its turning out cloudy, I had arranged that the whole operations were to be gone through just as for a drill, so that we should have been in a position to take immediate advantage of any break in the clouds, discretion being of course exercised in altering the uniformity of the intervals between the plates, in order to take advantage of any passing gleam of clear sunshine. Fortunately it was fine and this precaution was not required, but I am sure that it was the only way of making certain of being ready at a moment's notice had the sky been cloudy.

Operations on the Day of the Transit.—After the cloudy weather of the previous two days, it was an agreeable surprise when we awoke on the morning of the Transit to find an almost cloudless sky. All preparations had been completed the night before and we were in our places betimes. As the first contact had been computed to occur at about 7h. 13m. 7s. (mean time) the order for commencing the preparation of the plates was given about 7 o'clock, and the work of the day commenced with the exposure of a Janssen plate for trial of the apparatus. After



this two six-inch plates were exposed and then, about bisection, another Janssen, followed by two more six-inch plates and then a third Janssen for the first internal contact, for the exposure of which a signal was to be given by Colonel Tennant. Owing to the wet plate prepared for this having slipped off the dipper, a dry plate was substituted and the plate was mounted in ample time. While watching the image carefully through the red glass, waiting for Colonel Tennant's signal, I noticed that the planet appeared to have passed well within the boundary of the solar disc, though still attached to the limb by a well and strongly defined ligament, so that the planet and ligament were of a distinct gourd-shape exactly like the appearance of the "black drop" one had been led to expect.* On development the plate showed no sign of any such gourd-like appearance, except at the 21st picture where the clock-work had dragged, and there an image appeared, the exact counterpart of what I had seen.

After this the regular work with the six-inch plates commenced and went on pretty regularly, at the stated intervals of two minutes between each exposure, till about half-past 9, when there was a break of 15 minutes for refreshment and to change the chronograph paper, &c.

Though this break may appear long, it had been found more convenient to have one long break than two or three shorter ones, on account of the loss of time in stopping and getting under way again. It was arranged that the break should take place either well before or after mid-transit, so as to be sure of pictures being taken about the time of mid-transit.

It was also arranged that when the signal for the break was given, all wet plates under preparation should be exposed and dry plates sent in till all the wet plates had been developed and every thing was ready for opening out the doors. In the same manner after the break, dry plates were sent in until the wet plates were ready. The work then went on as before till the time came for mounting the Janssen for the second internal contact, which was exposed by signal from Colonel Tennant. Two more six-inch plates were then taken, then a Janssen, followed by two more six-inch plates, and last of all a Janssen, about the time of last contact, which was exposed and closed a few seconds before the final contact, thus concluding the work.

The sequence of the plates in the racks was examined and the plates were left to dry till next day and then replaced in the plate boxes.

It had originally been intended that 120 six-inch plates should be taken, as it had been found quite possible to do so at the rehearsals, but as I was perfectly dependent on Colonel Tennant's signals for starting the Janssen plates, I allowed plenty of time so as to make sure of having the

* Colonel Tennant remarks with reference to this—"There is no doubt in my mind that the outer part of the sun is *never* free from the result of outstanding astigmatism. For Janssen plates it should have been specially cared for at the expense of the central portion of the picture."

Janssen plates ready when required, without hurry ; and so only two plates were taken between the Janssens instead of four, as had been arranged.

The result of the day's work was 109 six-inch plates taken, but of these two failed entirely, so that only 107 can be counted. These are all fairly clean and free from fog or stains but in many of the plates the images are not so sharp as could have been desired. Though the day was fine and cloudless, there was a good deal of haze and I think the want of sharpness is chiefly due to this and other atmospheric conditions, as the same faults were observed for two or three days after the Transit.

Of the Janssen plates there were five which also were, for the most part, clean, good plates, fairly well defined though not perfectly sharp.

Several of the photographs shew marked irradiation round the planet, and a want of sharpness which may be partly due to the atmosphere of the planet, as the limb of the sun is very much sharper. On some of the pictures distinct streamers are visible round the limb of the planet and proceeding from it. I have not seen anything of the kind mentioned as being observed by other parties, and, as the appearance is not visible on all the negatives, it is no doubt a form of photographic irradiation ; but, if not, a comparison of the Roorkee negatives with those taken at other places may throw light on the cause of it.

None of the plates were varnished, as it was considered undesirable to varnish plates intended for future measurement, and also to obviate any chance of the varnished films cracking when removed to England, as is often the case with negatives taken in this country.

With the exception of the want of sharpness of some of the plates, the operations may be considered quite successful as far as the mere photography is concerned. The arrangements described above and the programme of operations answered admirably and I cannot suggest any improvement. Whether the photographs are sufficiently sharp and perfect in other respects to answer the purpose intended still remains to be seen.

General Remarks.—During the course of the preparations a good deal of time had to be devoted to putting some of the instruments into proper working order, in which work I was much assisted by Captain Campbell, who had charge of the operations with the great 36 in. theodolite. Thus for some time, the Janssen plates were found to be fogged and so indistinct as to be almost useless. This was due, partly to reflection of light from the polished surface of the wood-work of the slide and the brass-work of the under surface of the exposing disc, which was partially obviated by covering with dead black varnish all the surfaces capable of reflecting light on to the sensitive plate, and partly to the ruby-red glass fixed in the revolving disc not being perfectly impervious to the actinic rays, but this defect was overcome by substituting a piece of thick ruby-glass for the thin, light-coloured piece originally supplied. Even with these precautions, some white light found

its way on to the plate between the revolving disc and the wooden case, which were at a greater distance apart than appeared necessary, though the entrance of light might have been prevented by fitting the exposing disc with a flange running in a groove cut in the wood-work of the slide or fastened above it. There was also considerable friction about the internal surfaces, which caused a strain on the clock-work and gave a good deal of trouble till the cause had been removed. With the exception of these defects, the slide seemed admirably constructed and adapted for the object in view. It remains, however, to be seen how far this ingenious instrument has answered the expectations of its inventor and those who have adopted it, but if it should be used at the next Transit, it would, I think, be desirable that arrangements should be made for the automatic movement to be continued or distributed at intervals over a much longer period than one minute, as on the present occasion, so that all the phenomena attending the contact may be fully observed and recorded. It is also very desirable that the photographer should not require a skilled observer to watch the time of contact for him. The doing so has a very disturbing effect on a man who is able to make a good observation of contact, and time is also lost in preparing and waiting for a signal.

As far as shewn by the plates obtained at Roorkee the differences between pictures taken a few seconds apart are so slight, and the advance of the planet is so imperceptibly marked, if indeed, there is not sometimes an appearance of retrogression caused by atmospheric tremor, that perhaps little would be lost by taking the pictures at intervals of 4 or 5 seconds instead of at every second.

The mounting of the slide necessitates the alteration of the adjustments of the telescope for taking the six-inch plates, thus stopping all such observations about the critical period and it is therefore most desirable that each operation with the Janssen slide should extend over as long a period as possible. Colonel Tennant tells me that the cusp measures are indefinitely more valuable, if good, than any six-inch plates, which he would *entirely* eliminate. In this case, if it were considered essential that the successive pictures should be taken at intervals of not more than one or two seconds, a second, or even a third, Janssen slide might be provided so that they might be rapidly changed one after the other. If it were feasible to construct the slide so that the plates could easily be changed without removing the whole slide from the camera, it would be better still, as in that case the observations could be carried on at every second or two, and three or four plates exposed in quick succession during five or six minutes about the time of contact, and, if desirable, continued at regular intervals afterwards; but this appears to present considerable mechanical difficulties and an arrangement would be required by which the revolving disc could be at once brought into the proper position

for exposing the successive plates instead of having (as in the present slide) to be reversed through an *entire revolution*, which alone takes nearly half a minute.

The photoheliograph, like all work turned out by Mr. Dallmeyer, was an excellent and perfectly finished instrument, but seemed to me to be scarcely sufficiently firmly mounted for continuous work extending over so many hours, with the constant shaking caused by the insertion and withdrawal of the dark slides, which were much stiffer than they ought to have been. This stiffness of the dark slides was found not to be due to climatic influence, because they did not agree in measurement with the focussing screen which fitted perfectly, and they had to be filed down considerably before they would fit; this defect, due no doubt to an oversight in the maker or to hurry in turning out the instrument, was a serious one, as besides the liability to tremor caused by the frequent alteration of declination, the focus might have been disarranged by the alteration in the thickness of the slides by filing, but there was nothing else to be done under the circumstances.

For my part, speaking merely as a photographer, I should prefer the system adopted by Lord Lindsay and the American parties in which the camera was an immovable fixture and the solar image retained in a constant position by means of a siderostat carefully adjusted to follow the sun. In any case, the slides should be constructed to fit quite easily into their places, and in this respect the dark slides made for the equatorial camera used at Dodabetta for photographing the solar eclipse in 1871, were of a much better pattern than those sent out with the photoheliograph.

Another defect of the photoheliograph was that the hanging counterpoise, placed near the object-glass of the telescope when using the Janssen slide, was found to swing and induce a tremor in the instrument, spoiling the definition of the pictures; it was therefore replaced with a rough, but efficient substitute, in the shape of a canvas bag, the ends of which were filled with shot. This was merely hung over the end of the telescope at the proper balancing point and kept the tube perfectly steady.

As regards the process to be adopted for photographing the Transit of 1882 much will depend on the results obtained by the different methods used in December last as to whether photography can be advantageously employed and, if so, which process is most suitable.

As far as my experience goes, the wet process seems less favourable to perfect sharpness and clearness of the image than the dry, but Colonel Tennant tells me he has lately obtained very superior results by using a pyrogallie acid developer with bromiodised collodion, in place of the iron development. From experience I have gained in preparing for photographing the recent Eclipse, I believe that great advantages may be obtained by slightly staining the ordinary wet films with orange or red anilin dyes or

by the use of *moist* plates, prepared with bromised or bromiodised collodion afterwards treated with albumen and glycerine, which I have found very simple to prepare and exceedingly free from all tendency to blurring or irradiation. It is probable, however, that before 1882 the usual modes now in vogue for taking negatives will have been quite superseded by the simpler method of using sensitive emulsions which have only to be poured on to the plates and dried without any further preparation. Great advances have recently been made by Carey Lea, Bolton and others in obtaining such emulsions capable of giving pictures with the same rapidity as the ordinary wet or dry processes and with a perfect freedom from the irradiation or blurring so detrimental in astronomical photography, besides which the perfect simplicity and ease of the operations are a strong recommendation; and I may, I think, safely predict that should photography be used for the next Transit, the emulsion processes will, if not exclusively, be used very extensively; unless, possibly, the superiority of pictures taken on daguerreotype plates or silvered glass films over those on collodion should be incontestably proved or some other better process be discovered meanwhile.

Although the photographic operations connected with the observation of a Transit of Venus present no great difficulties, and are in some respects easier than photographing the total phase of an Eclipse, a great deal of patient careful work is required beforehand to ascertain the best conditions for working with regard to local circumstances, and this the short time at my disposal on the present occasion scarcely allowed me to have, especially as so much time was spent over the dry process, which might, as the event proved, have been well employed in perfecting the wet. It is therefore very desirable that the subject should not be lost sight of between this and the next Transit and that every opportunity should be taken of utilising the experience already gained towards ascertaining the most perfect methods of taking these sun-pictures. It would also be advisable that as many as possible of the observers of the last Transit should also take part in the next.

Although the Transit of 1882 will not be visible in any part of India, much useful preparatory photographic work might be done concurrently with the daily observations of sunspots, now that an instrument is available for taking advantage of the comparatively fine weather enjoyed in this country, particularly at the time of year when the weather in Europe is most unfavourable to such observations; and this would not be the least among the many advantages to Science to be gained by the establishment of a Solar Observatory in this country, which has been so earnestly advocated by Col. Tennant and, it is to be hoped, will soon be an accomplished fact.

XI.—*Descriptions of new Marine Mollusca from the Indian Ocean.*

By G. and H. NEVILL.

(Received July 16th ;—Read August 4th, 1875.)

(With Plates VII and VIII.)

The types of the new species of shells described in this paper mostly belong to the family *Pleurotomidæ*, and are all in the collection of the Indian Museum.

MUREX (OCINEBRA) GIBBA, Pse.

Latirus gibbus, Pease, Am. J. Conch., 1867, (*Sandwich I.*)

Murex Crosseana, Lién., J. de Conch., 1874, (*Mauritius*).

We have found this shell at Ceylon, the Seychelle, and Andaman Islands ; it is nowhere a common shell.

MUREX (OCINEBRA) FISCELLUM, Ch. var.

Chemn., Conch. Cab., fig. 1524-5, (*Pulo Condor*).

M. Liénardi, Crosse, J. de Conch., 1868, (*Mauritius*).

We have found both the type form and the var. *Liénardi* at Mauritius, also at Ceylon and Aden the above var. only ; a large series of specimens in all stages of growth show that the two forms cannot be retained as distinct species.—The very common *Sistrum undatum* (Ch., fig. 1851-2, Tranquebar) must not be confused with the above, as well pointed out by Chemnitz in his original description, as also by v. Martens (Vorderasiat. Conch., p. 95) ; we have found the typical form of *S. undatum*, with whitish aperture, at Ceylon, Mauritius, and Natal ; var. *Indica*, nobis, (de Blainv. pl. X, fig. 8) at Ceylon, Mauritius, Singapore, Bombay, Andamans, Penang, Arakan, Bourbon, and Seychelles ; var. *subturrita* (de Blainv. pl. X, fig. 12) at Mauritius only, where it is rather scarce ; the Museum also possesses specimens of var. *margariticola*, Brod. (Conch. Icon., fig. 28) from the N. Coast of Australia : this form differs from var. *Indica* by the fewer, more nodulous ribs, becoming more rapidly obsolete, by its stouter and thicker growth, by the more regular transverse sculpture, and by its more sombre colouration.

CONUS CEYLONENSIS, Brug.

As already surmised by v. Martens (Don. Bism., p. 32), Pease is wrong (Am. J. Conch., 1867, p. 126) in uniting *Conus Ceylonensis*, Brug. with *Conus pusillus*, Ch. (Conch. Icon. fig. 154) ; both are abundant species at low water on the reefs at Ceylon and the Andamans ; the latter species we have also found at Mauritius and the Seychelle Islands. Not only, how-

ever, the shells, but the animals also are quite distinct; the latter in *Conus Ceylonensis* being a bright scarlet throughout, the body minutely, almost imperceptibly streaked with white, the siphon the same, only much more distinctly so; the animal of *Conus pusillus* is, on the other hand, pure white, with a narrow pink rim round the extremity of the siphon and at its base, and the posterior end of the body is also tinged with pink.

DRILLIA LUCIDA, n. sp., Pl. VIII, Fig. 15.

Shell acuminate fusiform, very smooth and glittering; white, slightly and irregularly marbled with pale brown here and there between the ribs and especially behind the outer lip; suture distinct, apex blunt and rounded, almost like that of *Pyramidella* in character; whorls 8 to 9, the two first smooth and embryonal, the others divided with a deeply incised groove beneath the suture, longitudinally, thickly, distantly ribbed; last whorl with 9 ribs, transversely striated at its base, gibbous posteriorly, with a rather considerable smooth space behind the marginal varix (as in Reeve's fig. 199, *Pleur. pudica*, Hinds), next the suture the upper part of the ribs, cut off by the deep spiral groove, have the appearance of a row of granules; columella and aperture smooth, a callous tubercle at junction of outer lip with the former, sinus very deeply excavated.

Long. 8, diam. 3 mil.

H. and A. Adams in their 'Genera of Recent Mollusca' class *Clavatula quisqualis* of Hinds as a *Clathurella*; it would, however, probably be better placed in *Drillia*, as is done with other allied spp. *robusta*, Hinds, &c. *D. lucida* resembles extremely closely the shell from South America figured and described by Hinds as *Clavatula quisqualis* (Voy. Sulph., pl. VI, fig. 5); the Indian species is smaller, with transverse striæ at base of the last whorl, with a row of granules and a deep groove beneath the suture, and with straight instead of oblique ribs. The type is from the Persian Gulf, where it was dredged rather plentifully by Mr. Blanford off Tumb Island and Gwádar; it was also dredged by Mr. Wood-Mason at the Andamans and found by the late Mr. Raban at Pooree in the Bay of Bengal; the specimens from the two last-named localities differ slightly from the type form, being a little more richly marbled with brown (much as in Hinds' figure of his *Clavatula lata*), and having the ribs on the last whorl a trifle more rounded and the penultimate rib in the centre of the back more developed than the others (presenting a varicose appearance).

DRILLIA ACUMINATA, Migh., Pl. VIII, Fig. 14.

P. Bost. Soc., 1845.

Shell fusiform, resembling in shape many small species of *Mitra*, somewhat smooth and shining, apex sharp and pointed (generally broken off);

bright brown, with a broad white band at the upper part of the whorls, repeated near base of the last whorl, this white band is more vivid and distinct on the ribs than in the interstices; whorls 8, the three first without sculpture, the others longitudinally flexuously ribbed, with a depression beneath the suture, last whorl transversely ribbed at its base, with approximately 12 longitudinal ribs, two of which in the centre of the back are joined together and have a varicose or gibbous appearance; columella and interior of aperture brown, smooth, outer lip sharp, very thin, sinus small.

Long. max. $6\frac{1}{2}$, diam. max. $2\frac{1}{2}$ mil.

Andaman I. and Ceylon, scarce at both places. We have given a fresh figure of this species from an Andaman specimen, as the figure in the Don. Bism. (pl. 1, fig. 1) is scarcely sufficient for satisfactory identification. Typical specimens in the Indian Museum from the Sandwich Islands in no respect differ from Indian Ocean ones.

MANGELIA FULVOCINCTA, n. sp., Pl. VII, Fig. 1.

Shell attenuately fusiform, shining; whorls nine, the first four embryonal and colourless, the third and fourth peculiarly and strongly carinate, the other five longitudinally, varicosely ribbed, seven ribs on the last whorl; under a lens, minutely but regularly transversely striated, striæ more or less obsolete on the ribs; white, with a chestnut-brown band immediately under the suture, more vivid in the interstices than on the ribs themselves, this brown band covers the columella and nearly the whole of the lower half of the last whorl, is also very strongly marked on the lower portion of the outer lip and within the aperture; columella and outer lip smooth, sinus obsolete, canal very short and truncate.

Long. 8, diam. 3 mil.

Type Bombay (Rev. S. B. Fairbank), also Ceylon (nobis), and Pooree (H. H. Raban).

(Coll. Indian Museum and H. Nevill.)

MANGELIA FAIRBANKI, n. sp., Pl. VII, Fig. 2.

We have long hesitated whether this shell should be distinguished from Reeve's *Pl. hexagonalis*, the differences between our shell and the figure in the Conch. Icon. seem however to necessitate it. *M. Fairbanki* can be distinguished by the more open canal, the five or six denticulations within the acute outer lip, the sharp transverse striæ, equally and strongly showing both on the ribs and in the interstices, the striæ distant from one another, only three on each whorl, the middle one slightly the largest, imparting a somewhat angulate appearance to the whorls; the longitudinal ribs are thicker and more rounded than in Reeve's figure; the shell has 8 whorls, the two first embryonal, slightly mammillate;



it is of an irregular leaden-brown colour, stained with a darker shade on the outer lip and on the columella.

Long. 6, diam. 2 mil.

Type Bombay, probably also Ceylon and Andamans; the specimens, however, from these two last localities are not sufficiently perfect for satisfactory identification. For the type specimens of this and for many other interesting species from the same locality, the late Dr. Stoliczka was indebted to the Rev. S. B. Fairbank.

MANGELIA (?) INTERRUPTA, Rv.

P. Z. S. 1846.

Daphnella bella, Pse.

Pl. gemmulata, D.

Amongst some hundred specimens in the Museum from the Sandwich I., Mauritius, Bourbon, Ceylon, and Abyssinia, a single Ceylon specimen alone shows minute denticulations just within the outer lip, as in Reeve's figure. A comparison with specimens in the British Museum marked *interrupta*, Rv. first enabled us to identify this species; the genus still seems to us doubtful, perhaps Carpenter (P. Z. S. 1865) is correct in placing it in the *Columbellidæ*. It is common in Ceylon, where it seems to be finer and better marked than elsewhere in these seas. If it should prove to be a pleurotomid, Pease's name *bella* had probably better be employed, as Lamarck and Sowerby have both described distinct shells as *Pleurotoma interrupta*.

CLATHURELLA RUGOSA, Migh.

Pl. curculio, Nevill, J. R. A. S. (Ceylon Branch), 1869.

Pease is quite wrong (Am. J. Conch. 1871, p. 25) in uniting this species with *C. scalarina*, Deshayes; the short rounded whorls, more produced spire, different character of the sculpture, absence of the second black transverse line on the whorls, amply distinguishing the latter; the former is abundant at Ceylon and Arakan, the latter at Mauritius, Bourbon, and Ceylon.

C. RUGOSA, var. *CURCULIO*, nobis, l. c., from Ceylon.

This variety has 12 longitudinal ribs on the last whorl, four transverse keels on the whorls, the two middle ones very prominent, the other two more or less obsolete, suture excavated, only very faintly stained brown, minutely and spirally striated; two transverse brown lines on the last whorl, showing also within the aperture; it does not differ from the type form sent us by Mr. Pease from the Sandwich I., as figured and described in the Don. Bism., except by its greater size.

Long. 8, diam. $3\frac{1}{4}$ mil. (last whorl, long. $4\frac{1}{4}$).

C. RUGOSA, var. *FALLAX*, nobis.

This is probably the form that induced Pease incorrectly to make *scalarina* a synonym of *rugosa*. This dwarf variety has 9 longitudinal ribs on the last whorl, the four transverse keels are less unequal in size, there is only one brown line on the last whorl and within the aperture (in this respect only does it agree with *scalarina*); the peculiar straight outer lip and consequently contracted aperture, as also the form of the whorls and suture, are the same as in the type form.

Long. $4\frac{1}{2}$, diam. 2 mil. (last whorl, long. 2).

Common at Mauritius and Bourbon; rare at Ceylon.

CLATHURELLA SCALARINA, Desh.

Specimens in the Museum agree exactly with the typical figure (especially as regards the rounded outer lip and open aperture); suture scarcely excavated, spirally minutely striated, six transverse keels on each whorl (the first and last somewhat indistinct), 12 longitudinal ribs on the last whorl (not 15 to 16 as in the original description); apex and suture stained an intense brown, only one brown line on the last whorl and within the aperture.

Long. 6, diam. $2\frac{1}{4}$ mil. (last whorl, long. $2\frac{1}{2}$).

Abundant at Balapiti in Ceylon; rare at Mauritius.

CLATHURELLA EXQUISITA, n. sp.

We found this shell marked in the British Museum as *Clathurella nebulosa*, Pease, but it differs totally from the shell described under that name (P. Z. S., 1860, p. 143), being of a beautiful pink colour with a white transverse band, not white with interrupted longitudinal brown lines as in Pease's description of *P. nebulosa*; it may rather prove to be a small variety of the shell described and figured by Pease from Paumotus (Am. J. Conch., 1868, p. 219) as *Clathurella canaliculata*; however, even if it should prove so, our name *exquisita* will stand for the species, as Reeve described a totally different shell as *P. (Clathurella) canaliculata*, P. Z. S., 1848; if the Paumotus shell proves to be distinct from our Mauritius one, as we think it is, we would suggest for the former the name of *Clathurella Peasei*. *C. exquisita* differs from *C. Peasei* by the absence of the dark brown line beneath the transverse white band, by its suture not being coloured brown, by the much greater contraction of the last whorl and the outer lip at their base, thus making a more prominent canal, by the last whorl having only 12 longitudinal ribs instead of 14, finally by its smaller size. We have not thought it necessary to figure this species, as it is one that cannot be mistaken.

Long. $9\frac{1}{4}$, diam. 4 mil.

Rather scarce at Mauritius.

CLATHURELLA REEVEANA, Desh.

Seems to be the same as a shell figured and described by Pease as *C. tumida* (Am. J. Conch. 1867). This species occurs at Mauritius and at the Andamans, at both of which places it is scarce. *C. Reeveana* and *C. cyclophora*, D. should, we think, form a distinct section of Clathurella, in which should probably be classed *P. subula*, *ægrotæ*, &c. of Reeve; in Adams' 'Genera' these latter are recorded as Daphnella.

C. cyclophora we found at Mauritius rather sparingly, also at Aden a single specimen of a shell which seems to belong to it, though in too bad a state of preservation for certain identification.

CLATHURELLA SMITHI, n. sp., Pl. VIII, Fig. 13.

Shell minute, angularly fusiform, attenuated, apex round, slightly sinistral; white, tinged with pale brown on the columella and outer lip; whorls seven, acutely angled in the centre, depressedly excavated on the upper half, which is devoid of sculpture; the first two whorls altogether without sculpture, the 3rd and 4th simply acutely keeled in the centre, the others closely reticulated, minute granules formed where the keels bisect one another, longitudinal keels obsolete on the lower half of the last whorl; in some specimens a prominent keel is present immediately beneath the suture of the last two whorls, in most, however, this is obsolete (as in the specimen figured); columella rather strongly twisted, sinus deep, outer lip reflected, transversely striated.

Long. $3\frac{1}{2}$, diam. $1\frac{1}{2}$ mil.

Mr. Blanford dredged 30—40 specimens of this minute shell off Gwádar and Tumb Island in the Persian Gulf; it perhaps nearest resembles Reeve's *Pl. concentricostata* (fig. 279), but is quite distinct; we have named it after Mr. E. A. Smith of the British Museum, who has lately described some interesting small shells from the Persian Gulf.

CLATHURELLA APICULATA, Montr., Pl. VII, Fig. 3.

J. de Conch. 1864, p. 264, (*N. Caled.*)

We propose to distinguish the Andaman form under the name of var. *minor*. Ten specimens of this variety were found living at Ross Island under blocks of coral at low water, it can only be distinguished from the type form, which has not yet been found at the Andamans, by its smaller size (long. $4\frac{1}{2}$, diam. $1\frac{3}{4}$ mil.). The row of opaque, white spots on the back of the last whorl are very characteristic. It is nearest allied to the next species, *C. Malleti*, which also lives at the Andamans and under precisely similar conditions: the slight but constant differences in shape and sculpture between the two are well shown in the accompanying figures. Dead specimens of *C. apiculata* are fairly abundant in Ceylon, in size closely approximating to the type form (long. $6\frac{1}{4}$, diam. 3 mil.)

(Coll. Indian Mus., Rev. J. Warneford, and H. Nevill.)



CLATHURELLA MALLETI, Recl., Pl. VII, Fig. 4.

J. de Conch. 1852, p. 254, (*Pacific O.*)

I found seven or eight specimens of this lovely species alive at the Andamans, at Ross Island and North Bay, under blocks of coral at low water; the shell is of the most brilliant purple imaginable; it agrees exactly with the original figure and description. (G. Nevill.)

(Coll. Indian Mus. and Rev. J. Warneford.)

CLATHURELLA PERPLEXA, n. sp., Pl. VII, Fig. 5.

This shell, though in many respects so like *Mangelia Fairbanki*, should probably be classed as a *Clathurella*; whorls 8, the last very short, three first embryonal, the others broadly, somewhat indistinctly longitudinally ribbed, ribs not so straight as in *M. Fairbanki*, but somewhat rounded, especially on the last whorl, three raised transverse striæ on the lower portion of each whorl, the uppermost one almost obsolete, a characteristic raised transverse keel immediately below the suture; uniform ash-color, a shade or two darker in the interstices of the ribs and near the apex; columella, outer margin of the lip and interior of the aperture bright chestnut-brown, columella a little twisted, outer lip very sharp, irregularly undulating, obsoletely granulated just within the aperture.

Long. 6, diam. $2\frac{1}{2}$ mil.

Type Bombay; also found in Ceylon.

(Coll. Indian Museum, and H. Nevill.)

CLATHURELLA NIGROCINCTA, Montr., Pl. VII, Fig. 6.

J. de Conch. 1872, (*N. Caled.*)

The colouration of the last whorl is remarkable: there are five rows of distant elongated nodules, of which the two first rows next the suture are of a leaden colour on a broad black band, the third row of a brilliant orange, the fourth and fifth pure white, these five rows of nodules (coloured in the same way) are then repeated.

About twenty living specimens of this shell were found at the Andamans, on Blair's Reef, Aberdeen, and Ross Island, under blocks of coral at low water.

Long. 9, diam. 4 mil.

CLATHURELLA SINGULARIS, n. sp., Pl. VII, Fig. 10.

Shell elongate, fusiform, sub-conical, apex pointed; white, in the centre of the ribs on the last whorl ornamented with obsolete brown spots; whorls nine, the first four embryonal, smooth, on the fourth traces of convex sculpture only, the last five transversely, regularly, rather broadly, somewhat distantly striated, longitudinally faintly and obtusely ribbed, nine ribs on the last whorl, becoming obsolete towards the base, the last rib next the

outer lip varicose, much more strongly developed than the others; ribs of the 5th and 6th whorls perfectly straight, on the 7th and 8th angulated about the middle, the last whorl angulated at about the 4th or 5th of the transverse striæ; columella straight, smooth, a small tooth-like projection at the commencement of the deep, rounded sinus; outer margin of the lip almost straight, much produced, exceedingly sharp; interior of aperture white, smooth, and shining; under a powerful lens only can be seen a microscopical, regular, longitudinal striation, these striæ are bent in the same way as the last varicose rib and should perhaps be called striæ of growth, they are a trifle more distinct close to the suture.

Long. $8\frac{1}{2}$, diam. $3\frac{1}{2}$ mil.

(Coll. Indian Mus. and Rev. J. Warneford.)

Three or four specimens only of this interesting species were dredged by Mr. Wood-Mason at a considerable depth at the Andamans. In shape and sculpture it resembles most closely *Cythara Delacouriana* of Crosse (J. de Conch. 1872, pl. fig.); the columella and outer margin are, however, both perfectly smooth and the sinus is much more distinct, the spire too is a great deal longer in proportion to the last whorl, in length the last whorl (measured at the back) is $4\frac{1}{2}$ mil., the other whorls altogether only measuring 4 mil. We have felt considerable doubt whether this species is correctly classed as a *Clathurella*; perhaps it would be better placed with *Mangelia*.

CLATHURELLA MASONI, n. sp., Pl. VII, Fig. 7.

Shell ovately fusiform, white, remarkably scalariform; six angular whorls, broader at the top than at their base, the first two rounded, smooth and embryonal, the others prominently and regularly, somewhat distantly, transversely striated (four striæ on the 4th and 5th whorls), longitudinally strongly ribbed, ribs pointed and very prominent at their commencement, nine of them on the last whorl; columella and aperture smooth, with a row of regular, rounded granules just within the acute margin of the outer lip, this latter is very broadly reflected and has a longitudinal, somewhat obsolete rib down its centre, this being decussated by seven transverse striæ presents the appearance of a double row of granules; the outer margin where it joins the body whorl is callous and thickened, the sinus very deep and rounded, the aperture small, contracted, as nearly as possible of equal width all the way down from the sinus to the end of the canal. This species agrees remarkably, as regards sculpture and shape of the whorls, with a shell described as *Pl. scalata* by Souverbie (J. de Conch., 1874, pl. VIII, fig. 4); it differs, however, by the totally different character of the aperture and by its fewer whorls.

Long. 4, diam. 2 mil.

Dredged by Mr. Wood-Mason at the Andamans.

*CLATHURELLA MARTENSI*, n. sp., Pl. VII, Fig. 8.

Shell regularly and conically fusiform, of rather dark brown colour with bright lilac granules; seven rounded whorls, reticulated with very thick somewhat distant ridges, forming at the points of intersection, three rows of large, pearl-like, slightly oblong granules, on the last whorl these three rows of granules are repeated, after the sixth row the shell abruptly becomes contracted, forming an excavated furrow, near the base there are again six rows of granules, but much smaller and more rounded, these give a somewhat angular appearance to the last whorl; the columella is much contorted, or twisted in the middle, of a lilac colour, with a few minute denticulations at its edge; the aperture and the four strong denticulations at its outer edge are also of a lilac colour, the sinus is deep and rounded, the outer lip is bright brown, abruptly contracted near its base, forming a strongly marked canal.

Long. 5, diam. 2 mil.

Tolerably abundant in sand from Balapiti in Ceylon.

(Coll. Indian Mus. and H. Nevill.)

CLATHURELLA ENGINEFORMIS, n. sp., Pl. VII, Fig. 9.

Shell narrowly elongate, convex, in shape resembling several species of the genus *Engina*, peculiarly attenuated and contracted towards the base, spire pointed; white, banded with a single somewhat irregular yellow band, repeated a little below the middle of the last whorl, some of the granules on this band are yellow, whilst others are white; whorls seven, distantly reticulated with thick, obtuse, longitudinal and transverse keels, the interstices, under a lens, minutely and closely longitudinally striated, the sculpture is very distinct and clearly marked on the last two whorls, but much confused and difficult to trace on the upper ones; as in the preceding species, pearl-like granules are formed where the ridges cross one another, in the present shell however they are more regular in size and more rounded, there are three rows of these granules on each whorl, besides an additional smaller one and some indistinct transverse ridges close to the suture; there are ten longitudinal keels on the last whorl; sinus deep, but rather contracted, bent down rather abruptly; aperture very straight and narrow, suddenly widening a little close to the end of the canal, seven rather large regular granules at the inner margin of the outer lip.

Long. $5\frac{1}{2}$, diam. $2\frac{1}{4}$ mil.

In sand from Balapiti in Ceylon.

(Coll. Indian Museum and H. Nevill.)

CLATHURELLA LEMNISCATA, Nevill, Pl. VII, Fig. 11.

J. R. A. S. (Ceylon Branch), 1869.

White, with one brown band just below the sutures and with a second one towards the base of the last whorl, the latter fills the excavated furrow and shows also in the interior of the aperture, the columella also is stained brown; whorls seven, distantly latticed with very broad longitudinal and transverse keels, forming oblong granules where they cross one another, there are four of these transverse granulose keels on each whorl, the upper one small and somewhat indistinct, the two middle ones very prominent, the lowest one small, scarcely perceptible, almost hidden by the next whorl; the last whorl has five of these keels, the first smaller than the others, then an excavated furrow as in *Clathurella fusoides*, Reeve, and in *Clathurella Blanfordi*, nobis.

Long. $6\frac{1}{2}$, diam. $2\frac{1}{2}$ mil.

In sand from Ceylon and Mauritius (nobis), Bombay (Rev. S. B. Fairbank), and Gwádar in Persia (W. T. Blanford).

We give a figure, from a Mauritius specimen, of this widely distributed little species.

(Coll. Indian Museum and H. Nevill.)

CLATHURELLA CONTORTULA, n. sp., Pl. VII, Fig. 12.

Shell globosely conical, somewhat peculiarly twisted or bent, suture distinct; white, with a pink tinge towards the top; apex very obtuse, with a decollated appearance; whorls 6, longitudinally ribbed, ribs thick and prominent, distantly transversely striated, so as to present a granulose appearance; at the base of the last whorl several rows of small granules; columella peculiarly twisted, aperture narrowly contracted, outer lip thick, in the middle bent inwards. This shell seems very close to Reeve's *Pl. obtusa*, the shape however is different, the aperture more contracted, &c.

Long. $5\frac{1}{2}$, diam. $2\frac{1}{2}$ mil.

Abundant in sand from Balapiti in Ceylon.

(Coll. Indian Museum and H. Nevill.)

CLATHURELLA BLANFORDI, n. sp., Pl. VII, Fig. 14.

Shell cylindrically ovate, elongate, sutures rather indistinct, apex sharp and pointed, a beautiful deep mauve colour throughout; whorls 7 to 8, longitudinally and transversely ribbed, ribs very prominent, of equal thickness, forming granules at the points of intersection, towards the base of the last whorl an excavated furrow as in our *C. lemniscata*, &c.; columella short and twisted, aperture moderately wide, contorted, with a rather large sinus, outer lip thickened with two or three granules just within the aperture.

Long. $5\frac{3}{4}$, diam. $2\frac{1}{4}$ mil.



In sand from Annesley Bay in Abyssinia. I have named this prettily coloured little shell after Mr. W. T. Blanford, to whom the Indian Museum is indebted for it, as well as for very many other interesting species from the same locality.

CLATHURELLA ARMSTRONGI, n. sp., Pl. VII, Fig. 13.

Shell pyramidically elongate, angular in the middle of the whorls, very pointed at base, suture distinct, apex very sharp and pointed; colour uniform chocolate-brown; whorls eight, the first two perfectly smooth, the 3rd and 4th with two transverse keels in the centre, the last four obtusely and distantly longitudinally ribbed, transversely regularly striated; columella much contorted or twisted, with a shining callosity which is prominently rugosely granulated as in the genus *Cythara*; aperture short and much contorted, with a large, prominent, tooth-like tubercle at the junction of the outer lip with the columella and with a remarkably wide, deeply excavated sinus; outer lip thickened, transversely striated, peculiarly and minutely, very closely granulated just within the aperture; in three of the four specimens the columella and margin of the outer lip are stained a brighter brown than the rest of the shell. The above characters will serve easily to distinguish this shell from *Pl. arctata* of Reeve, the only species which, as far as we know, it at all resembles.

Long. 5, diam. $2\frac{1}{4}$ mil.

The type was dredged by Mr. Wood-Mason at the Andamans in 25 fms. Dr. Armstrong of the Indian Coast Survey has also presented to the Indian Museum three specimens, which he dredged at about the same depth in the Paumben Straits, in these latter the columella and outer lip are stained a bright brown, but there is no other difference from the type form.

CYTHARA GRADATA, n. sp., Pl. VII, Fig. 15.

Shell compressedly, ovately oblong; sutures excavated, apex very obtuse, having a decollated appearance, pure white throughout; whorls six, longitudinally ribbed, ribs continued to the extreme base of the last whorl, transversely very regularly striated, columella almost straight, slightly rugose at its upper part; aperture narrowly contracted, especially towards its base, sinus small; outer lip very thick, regularly rounded, granulated just within the aperture.

Long. $5\frac{1}{2}$, diam. 2 mil.

Not uncommon in sand from Balapiti in Ceylon (nobis) and Bombay (Rev. S. B. Fairbank).

(Coll. Indian Museum and H. Nevill.)

CYTHARA DUBIOSA, n. sp., Pl. VII, Fig. 18.

We have felt considerable doubt whether the present species is really distinct from the shell described by Reeve as *Mangelia coniformis*, Gray

MS., the greater thickness of shell, straighter outer lip, and less oblique longitudinal ribs seem, however, to distinguish the present form. Shell ovately conical, thick, apex mammillate; white, with a broad brown stain on the back of the last whorls; whorls 7, the first three embryonal, the next three angular, the longitudinal ribs only beginning towards the base of each of them, give the appearance of a row of nodules just above the suture; the last whorl unusually straight and regular, with an excavated shelf at the top, transversely and closely striated, striæ somewhat obscure, peculiarly undulating and interrupted, decussated with somewhat indistinct longitudinal almost straight ribs, commencing at the base of the excavated shelf; regularly and closely denticulated both on the rather widely spreading callosity covering the columella and also just within the margin of the straight outer lip; aperture contracted, much straighter and narrower than in Reeve's figure of *coniformis*.

Long. $7\frac{1}{2}$, diam. 4 mil.

Apparently very scarce, four specimens in sand from Mauritius and one from Port Blair, Andamans.

CYTHARA ISSELI, n. sp., Pl. VII, Fig. 17.

Shell thick, ovately conical, suture very distinct, apex pointed; white, with an orange band in the middle of the whorls, the band repeated on the last whorl, this band is distinct on the longitudinal ribs, but only here and there traceable in their interstices; whorls seven, the first three embryonal (in dead specimens nearly always wanting), the others longitudinally concentrically ribbed, ribs very thick, throughout closely transversely striated; columella nearly straight with a moderate sized callosity, closely covered with distinct granules and transverse rugosities; aperture narrow, widening somewhat abruptly near the base, sinus moderate, outer lip thickly reflected, transversely striated, slightly rounded, a row of large, regular granules just within the aperture.

Long. $7\frac{3}{4}$, diam. 4 mil. (decollated specimen of four whorls only).

Common in sand from Balapiti, Ceylon.

I have named this shell after M. Issel of Genoa, whose works on the shells of the Red Sea, Persia, and Borneo, afford most valuable aid in determining our Indian Ocean shells.

(Coll. Indian Museum, Rev. J. Warneford, M. Issel and H. Nevill.)

CYTHARA ISSELI, var. CERNICA, (? sp. nov.), Pl. VII, Fig. 16.

Considerably smaller than the type form, the entire, full grown figured specimen being only $6\frac{1}{2}$ in length and $2\frac{3}{4}$ mil. in breadth; there is apparently no other difference, except that the sinus is a trifle less distinct, and the aperture a little straighter.

Mauritius,—rare.

**MARGINELLA (GLABELLA) PICTURATA**, Nevill, Pl. VIII, Figs. 8—9.

J. A. S. B. 1874, p. 23.

We have nothing to add to our description of this pretty little shell, which would appear to be very local, as we have only seen specimens from the Mauritius.

MARGINELLA (VOLVARINA) INCONSPICUA, Nevill, Pl. VIII, Figs. 10—11.

J. A. S. B., 1874, p. 23.

The Museum is indebted to the Rev. S. B. Fairbank for specimens of this species from Bombay; the type is from Mauritius, where it is tolerably abundant.

MARGINELLA (VOLVARINA) DEFORMIS, Nevill, Pl. VIII, Fig. 12.

J. A. S. B., 1874, p. 23.

This appears to be a very rare shell, three or four specimens, all from Ceylon, being the only ones we have ever seen.

MARGINELLA ISSELI, n. sp.

We propose to change to *Marginella Isseli* the name of a shell called *M. pygmaea* by Issel (Malac. del Mar Rosso, p. 216), there being already a species of that name described by Sowerby in 1846. This minute species was dredged abundantly by Mr. W. T. Blanford off the coast of Persia in 25 fms.

NASSA OBESA, n. sp., Pl. VIII, Figs. 2—3.

Shell thick, stout, globosely conical, smooth and shining, spire very pointed, apex acute; brown, indistinctly and minutely mottled with white, irregularly stained near the suture with a darker shade of brown, the colouration agrees perfectly with Reeve's fig. 6 (*mutabilis*, L., from the Mediterranean); whorls 10, the three first without sculpture, very small, the others longitudinally, obliquely thickly ribbed; the ribs and their interstices are of about equal thickness, the former are almost, or altogether, obsolete on the back of the last whorl, four or five, however, are always present close to the callous rib behind the outer lip; transversely somewhat distantly grooved, the grooves towards the base of the last whorl and the two or three upper ones more deeply incised than the others and forming two rows of more or less granulose ridges immediately beneath the suture; columella with a moderately large white callosity, slightly rugose, aperture ridged near its margin.

Long. max. (wanting the three first embryonal whorls) 22, diam. max. 14 mil.

Kutch,—rare. Major Godwin-Austen has been good enough to compare this species for us with the British Museum and Mr. Hauley's collections; he

confirms our opinion that it appears to be new, the nearest he could find being Reeve's *algida* (Conch. Icon., fig. 145), from Moreton Bay, Australia; the present species bears a remarkable resemblance in many respects to *N. mutabilis*, its thickness, different sculpture, rugose columella, &c. will, however, distinguish it. At Ceylon and Penang we have found a variety which approaches nearer to *N. algida* than the figured type form from Kutch.

N. OBESA, nobis, var. *CEYLONICA*.

More acuminate, less globose, suture more distinct; longitudinal ribs on the antepenultimate whorl more or less obsolete, transverse grooves on the last two whorls almost obsolete; callosity on the columella a shade more defined and less rugose.

Long. (perfect specimen) 19, diam. 10 mil.

Ceylon and Penang.

(Coll. Indian Museum and H. Nevill.)

NASSA PERSICA, v. Mart.

Deshayesiana, Iss.

A common shell both at Aden and the Andaman Islands. It is admirably described and figured in a most interesting and important paper by von Martens, published as a separate part of the 'Nov. Conchol.' under the title of 'Ueber vorderasiatische Conchylien.'

COLUMBELLA PARDALINA, Lam.

This most variable species abounds on the reefs at the Andamans, where one of us collected many hundreds of specimens in all stages of growth. Pure white specimens, exactly agreeing with Souverbie's figure, were abundant, another very similar variety also occurs, white with a broad pale yellow band round the last whorl (with or without a few yellow spots on the spire); specimens marked like Reeve's fig. 75 A. and C. are also common, but considerably smaller and more compressed: this last variety may be called *Andamanica*.

Typical form, very common in Ceylon, long. $16\frac{1}{2}$, diam. 9 mil.

Var. *lactescens*, Souv., J. de Conch. 1866, long. 13, diam. 7 mil.

Var. *Andamanica*, long. max. $12\frac{1}{4}$, min. 10, diam. max. $6\frac{1}{2}$ min. $4\frac{1}{4}$ mil.

COLUMBELLA (MITRELLA) BALTEATA, n. sp., Pl. VIII, Fig. 4.

Shell small, elongately fusiform, spire about the same length as the last whorl, apex pointed, of a bright red colour; light reddish brown, a single belt of dark red in the middle of the whorls between the ribs, the ribs themselves in their centre are indistinctly white spotted; whorls 7, the upper ones smooth, the others longitudinally ribbed, ribs obsolete near the suture;



transversely indistinctly striated, a groove below the suture of the upper whorls, becoming obsolete near the last whorl; columella simple and twisted, outer lip acute, slightly emarginate at the top, aperture striated within.

Long. 5, diam. $1\frac{1}{2}$ mil.

Mauritius. Not common.

ZAFRA POLITA, n. sp., Pl. VIII, Fig. 5.

Shell small, slenderly fusiform, attenuated at both ends, perfectly smooth, glistening spire contorted, nearly but not quite as long as the last whorl; white, with two bands of irregular opaque white flakes on each whorl (four on the last); whorls 6 (the figured specimen has had the first broken off), the last striated at its base, outer lip remarkably thick and bent inwards, making the aperture peculiarly contracted.

Long. $3\frac{1}{2}$, diam. $1\frac{1}{2}$ mil.

Mauritius,—rather scarce.

Easily distinguished by the absence of sculpture and by its remarkably contracted aperture from its nearest ally, *Z. ornata*, Pease. *Z. purpurea*, H. Ad. from New Hebrides is also found at Mauritius.

ZAFRA SEMISCULPTA, n. sp., Pl. VIII, Figs. 6—7.

Shell narrowly lanceolate, turreted, spire a little longer than the last whorl, apex pointed; horny-brown throughout; whorls 7, the three first without sculpture, the rest longitudinally thickly ribbed, ribs about twice as broad as their interstices (in this respect our figures are slightly at fault), obsolete on the back of the last whorl, which is transversely striated at its base; a sharply defined callosity covers the columella, outer lip scarcely thickened or reflected, not as long as the columella, slightly emarginate at junction with the last whorl; aperture narrow and contracted, as wide at the top as at the base.

Long. 3, diam. 1 mil.

This species was dredged by Mr. Blanford at Cape Negrais, off the coast of Burma.

SISTRUM VENTRICOSULUM, n. sp., Pl. VIII, Fig. 16.

Shell small, ovately ventricose, very gibbous in the middle, thick, solid, abruptly attenuated at base; spire short, acutely pointed, about half the length of the last whorl; white, here and there stained with pale brown; whorls 7, the first four very small, embryonal, without sculpture, the next has two rows of unequal granules, the lower row somewhat pointed and much the larger; the last whorl widely excavated at the suture, with a row of prominent granules, rounded beneath with distant, somewhat indistinct longitudinal ribs, transversely rather distantly keeled, forming slightly pointed granules where they intersect the ribs, the interstices under a lens very mi-

nutely and closely longitudinally striated; columella with a moderately spread callosity, which is slightly rugose; canal long, not recurved; four denticulations within the aperture, the two upper ones very thick and prominent, outer lip much thickened, slightly emarginate at the upper part.

Long. $5\frac{3}{4}$, diam. $3\frac{1}{2}$ mil.

Ceylon — Rare.

This is the smallest species of the genus as yet described.

EULIMA ACUFORMIS, n. sp., Pl. VIII, Fig. 1.

Shell very elongate, sharply pointed, white and shining, solid, flexuous; whorls 17, cylindrical, slightly angulate at their base, except the last whorl which is short and rounded; no impressed line at the suture, varices obliquely continuous; aperture oblong, slightly produced in front, rounded at base; columella reflected, outer lip scarcely thickened.

Long. 10, diam. $2\frac{3}{4}$ mil.

Dredged at the Andaman Islands by Mr. Wood-Mason.

Rare. The above character will easily distinguish this graceful shell from its nearest allies, *E. lactea* and *flexuosa*, A. Ad.

(Coll. Indian Museum and Rev. J. Warneford.)

EULIMA (ARCUELLA) MIRIFICA, Nevill.

J. A. S. B. 1874, (*Mauritius*).

We have lately noticed that H. and A. Adams described a genus under the name of *Bacula*, allied to *Eulima*, (in A. & M. N. H., 1863, Vol. XI, p. 18) founded on a species from China, which they called *striolata*; this shell probably belongs to the same genus as the species from Mauritius, which we described as above; in either case our name for the genus, or sub-genus, will stand, there being a genus *Baculum* described prior to 1863.

MITRA (TURRICULA) CRUENTATA, Ch.

Fig. 1438-9, from the *E. Indies*.

Typical specimens, as admirably figured by Chemnitz, are found at the Nicobars (probably the locality whence the type came) and Andamans; they have two white bands on the last whorl, with 10 to 11 distant, flexuous ribs, nodosely angled at the upper part; the transverse grooves rugose, approximately equally incised, forming tolerably regular and oblong granules where they intersect the ribs.

Long. $19\frac{1}{2}$, diam. 8 mil.

M. CRUENTATA, Ch. var. *PROXIMA*.

This is the shell from the Philippines figured by Reeve (fig. 126) for *cruentata*, Ch.; it is a form which is often mistaken for Reeve's *M. armillata*; it has 16 ribs on the last whorl, is a trifle less flexuous, and less prominently



angled at the upper part than the type form; the transverse grooves and double white band are similar.

Common at the Andaman I.

Long. 19, diam. $6\frac{1}{4}$ mil.

M. CRUENTATA, Ch. var. *SANDVICHENSIS*.

Extremely close to the preceding is the form from Ascension I. (Pacific O.) sent to us by Mr. Pease as "*M. armillata* (?) perhaps *cruentata*, Ch." This variety is recorded in the 'Donum Bismarckianum' as *armillata*, Rv.; from which it differs by the less flexuous ribs and different shape of the whorls, being nearer Reeve's *amanda*; it seems to us to be best classed as a variety of *cruentata*, Ch.: the whorls are not angulate near the suture, the transverse grooves are nowhere rugose but are more or less obsolete in the centre of the last whorl; a groove at the upper part being more deeply incised than the others (in this respect it agrees with *armillata*), gives the appearance of a row of prominent, bisected tubercles just below the suture; there are 21 ribs on the last whorl, which are only very slightly flexuous, it has a single white band only.

Long. $5\frac{1}{2}$, diam. 6 mil.

M. CRUENTATA, Ch., var. *AMANDA*, Rv.

Reeve's *M. amanda*, (fig. 318) from the Philippines is only a variety of this protean species. Specimens dredged abundantly by Dr. Stoliczka at Singapore agree exactly with Reeve's typical figure and description. It differs from *cruentata* var. *proxima* by the whorls not being angulate, by a deeply incised groove near the suture, forming a row of oblong tubercles next the suture, by the much greater width of the white bands and by the less vivid orange tinge of the ribs, which are 16 to 20 in number; and from *cruentata* var. *Sandwichensis* by the more regular and rugose transverse striation and by the broad double white bands;—it is in fact intermediate between the two.

Long. 13, diam. 5 mil.

Two specimens from Aden, unfortunately not in good condition, apparently belong to this variety, the ribs are, however, more distant. Reeve's *armillata* (fig. 315) from the Philippines, may perhaps prove also to be a variety of *cruentata*, or it may be a variety of *obeliscus*, Rv.; it seems intermediate between the two.

MITRA (*TURRICULA*) *OBELISCUS*, Rv. var. *ANDAMANICA*.

Pl. VIII, Figs. 19—20.

Shell slenderly fusiform, shining; very dark brown with a single very narrow white band, more distinct on the ribs than in their interstices; whorls 9—10 (as in *M. cruentata* and all its varieties), produced, very slightly

turreted, not angulate at the upper part; 18 flexuous longitudinal ribs on the last whorl, perfectly smooth except near the suture, where they are divided by a groove, interstices transversely regularly grooved; canal short, not recurved, columella and interior of the aperture dark brown.

Long. 14, diam. $4\frac{3}{4}$ mil.

Dredged by Mr. Wood-Mason at the Andamans.

This shell in many respects resembles Reeve's *M. armillata*; the above characters will, however, easily distinguish it.

MITRA (TURRICULA) RADIUS?, Rv. (an *DÆDALA*, var.?) Pl. VIII. Figs. 17—18.

Shell pyramidically fusiform, pointed, shining; white, with a broad brown band over the lower half of the last whorl and within the aperture, apex brown; whorls 10, turreted, more cylindrical and produced than those of *M. dædala*, Rv. (fig. 281) or *glandiformis*, Rv. (fig. 310); longitudinally flexuously ribbed, ribs slightly thickened near the suture, interstices regularly engraved with transverse striæ; four folds on the columella, the lower one almost obsolete (Reeve gives only two folds to his *M. radius*).

Long. $13\frac{1}{2}$, diam. $4\frac{1}{2}$ mil.

Dredged by Mr. Wood-Mason at the Andamans; rare.

This seems to be doubtfully distinct from *M. dædala* and *glandiformis*, both of which are common shells at the Andamans and at Ceylon; they all appear to run into one another and may prove to be varieties of one and the same species.

MITRA (SCABRICOLA) PRETIOSA, Rv.

P. Z. S. 1846.

Mitra Antonia, H. Ad., P. Z. S. 1870, (*Red Sea*).

This species also was lately obtained rather abundantly by Mr. W. T. Blanford in the Gulf of Oman on the coast of Persia, as also was *Turricula* (*Thala*) *casta*, H. Ad. (P. Z. S. 1872, p. 9, from the Red Sea) and a new species very closely allied to the latter.

RISSOINA (?) ABNORMIS, n. sp., Pl. VIII, Fig. 23.

Shell small, thick, shortly fusiform, white, suture distinct; apex remarkably abruptly and truncately sinistral, as in the *Pyramidellidæ*; whorls 6, the two first embryonal, without sculpture, the others longitudinally somewhat thickly ribbed (the figured specimen being rather young, the ribs are less developed than in mature specimens), the last whorl rounded, with about 15 ribs, obsolete towards the base; throughout transversely, closely, somewhat rugosely striated, so as to form minute, indistinct granules where the striæ intersect the ribs; columella strongly twisted at base, covered with a moderately widely spread callosity; aperture small, peculiarly



deeply channelled at base, within showing the transverse striation on the back of the last whorl; outer lip produced, rounded, no sign of any emargination at the upper part, much thickened, transversely striated, with a subgranulose appearance, crenulated at the margin.

Long. max. 3, diam. max. $1\frac{1}{2}$ mil.

Mauritius; not uncommon in sand.

This should probably constitute a distinct sub-genus of *Rissoina*, distinguished by the very distinct canal, twisted columella and sinistral apex; a shell dredged in Japan by A. Adams and distributed by him as "*Lachesis*, n. sp." is a very closely allied species.

CYCLOSTREMA EBURNEA, n. sp., Pl. VIII, Figs. 21—22.

Shell depressedly orbicular, thick and callous, ivory white and shining, suture distinct; whorls 5, sharply angled a little below the centre; longitudinally obliquely plicated, ribs very massive, slightly wider than their interstices, obsoletely granulated at the angulation; interstices transversely very closely, beautifully and regularly striated, old specimens (as the figured type) are very callous and the transverse striation becomes almost obsolete; a very prominent, thick, transverse, rounded keel at the periphery, sculptured like the whorls; $\frac{2}{3}$ of the base sculptured as above, the transverse striation being however more distinct, the remaining $\frac{1}{3}$ round the umbilicus is smooth, the sculpture becoming abruptly obsolete; umbilicus moderate, in old specimens partly covered by the thickened columella, aperture irregularly rounded, margins callous and thickened, slightly reflected over the umbilicus, giving a notched appearance to the columellar margin.

Alt. $2\frac{1}{4}$, diam. $4\frac{3}{4}$ mil.

Pooree, in the Bay of Bengal. Rare.

This handsome species is like no species of the genus as yet described; it perhaps most resembles the West Indian *cancellata* of Marryat, and it is possible that the specimens from the Philippines recorded in the Thesaurus under that name may prove to belong to our species.

RINGICULA ACUTA, Phil.

Mal. Zeits. 1849, (*Aden*).

R. minuta, H. Ad., (*Suez*).

Both var. *minuta* and the larger typical form are extremely common at Aden, in the Gulf of Oman, and at Gwádar on the coast of Persia, as also at Bombay, Ceylon, and Arakan; an allied form (if not the same) was also obtained by one of us at Natal; the largest adult specimen in the Museum measures long. $4\frac{1}{2}$, diam. 3 mil., the smallest long. $1\frac{1}{4}$, diam. 1 mil.; there are also numerous full-grown specimens of many intermediate sizes. Curiously enough, Dr. Stoliczka obtained this species at Singapore, but not *R. Caron*, Hinds. Dr. Armstrong has presented to the Museum a single speci-



men lately dredged alive in Paumben Straits in 39 faths., which must apparently be referred to *R. acuta*, though it is thicker and more callous than any of the Persian Gulf specimens and the striation is entirely obsolete; owing to its much thicker texture and more developed teeth, the aperture is much more contracted; other specimens may eventually prove this form to belong to a distinct species.

RINGICULA CARON, Hinds.

Voy. Sulph. 1844, (*Malacca*).

This species also was dredged by Mr. Blanford at Gwádar; it is quite distinct in all its characters from *R. acuta*, the peculiar and very different outer lip, slight development of the parietal tooth, and different texture and striation at once distinguishing it.

RINGICULA APICATA, Nevill.

J. A. S. B., 1871, (*Mauritius*).

Lately found by one of us at the Andamans rather abundantly; it is only distinguishable from *R. acuta*, Phil. var. *minuta*, H. Ad. by its smooth, polished appearance, having only three striæ at the base of the last whorl, instead of being striated throughout as in the other species; it is slightly narrower and more contracted, less callous, with the teeth more sharply developed.

RINGICULA ABBREVIATA, n. sp.

Closely allied to *R. Caron*, Hinds; it has the same regular striation throughout and peculiar corrugated or crenulated outer lip, but has only $3\frac{1}{2}$ whorls, the spire being strikingly short and truncated in appearance; there is no tooth within the outer lip, the parietal tooth is strongly developed, the callosity is extremely broadly reflected on the lower part of the columella and is rugose and sub-obsolete granulose, there are two teeth on the columella, the lower one of which in some specimens is bifid.

Long. 3 (of which the last whorl alone measures $2\frac{1}{2}$), diam. $2\frac{1}{2}$ mil.

Balapiti in Ceylon, rather common.

(Coll. Indian Museum and H. Nevill).

TROCHUS (TALLORBIS) ROSEOLA, Nevill.

J. A. S. B., 1869, (*Ceylon*).

T. (Euchelus) Lambertii, Souv., J. de C. 1875, (*N. Caled.*)

That M. Souverbie should have overlooked our original description of this remarkable form is unaccountable, the more so that the figure is an excellent one, and that the description, as indeed does the name also, indicates the peculiar colouration of the shell. It may be well to take this opportunity of stating, that we have found in our Indian seas the greater



part of the new marine species described from New Caledonia by M. Crosse and Souverbie; for instance, we had prepared a description of a new *Euchelus* found by one of us alive at extreme low water on a reef at Port Blair, Andaman Islands; on receipt, however, of No. 1 of the Journ. de Conch. for 1875, we found the same species admirably described and figured by M. Souverbie from N. Caledonia, under the name of *Trochus* (*Euchelus*) *fossulatulus*.

TROCHUS SATRAPIUS, v. Mart.

Nov. Conch. Sup. V, (*Bushire*).

T. (Clanculus) Tonnerrei, Nevill, J. A. S. B., 1874, (*Aden*).

The specimen described by v. Martens is considerably bigger than any found by us at Aden; in other respects they seem to be exactly similar; the denticulations at the base of the columella and within the outer lip were not sufficiently marked in our figure, though properly recorded in the description. When we published our species the part of the Nov. Conch. containing the above description had not reached Calcutta.

TROCHUS (GIBBULA) HOLDSWORTHANA, Nevill, var.

J. A. S. B., 1871, (*Ceylon*).

Minolia variabilis, H. Ad., P. Z. S., 1873, (*Persia*).

This small variety was dredged tolerably abundantly in the Gulf of Oman by Mr. Blanford. After a close and careful examination we can detect no difference from the type form, except in the considerably smaller size of the Persian Gulf shell; we must, however, state that in this respect we have seen no intermediate specimens. The Museum possesses typical specimens of *G. Holdsworthana* from Penang, as well as from Ceylon.

In a collection of shells, numbering some 600 or 700 species, dredged by Mr. W. T. Blanford off the coast of Persia, and presented by him to the Indian Museum, are specimens of the following interesting shells: a single specimen of a species of our genus *Robinsonia*, perhaps our *R. Ceylonica*; a new species of *Niso* and our *N. pyramidelloides* (the latter was also dredged in the Paumben Straits by Dr. Armstrong); *Rissoina Stoppanii* and *R. Bellardii* of Issel, with ten other species of the genus; *Fossarus Stoliczkanus*, nobis, and three new species of the genus; *Rimula propinqua*, A. Ad.; a new species of *Limaca*, very close to the European species; *Eucharis angulata*, H. Ad. and *Næra pulchella*, H. Ad., &c.

It may perhaps be well to record here that specimens of *Macrochlamys Geoffreyi*, H. Ad. (P. Z. S., 1868, p. 290) are marked in the collection of

the Jardin des Plantes at Paris, as *Helix nulla*, Fér., *H. setiliris*, Bens. as *H. turbida*, Fér., *H. argentea*, Rv. as *delibata*, Fér. (also Beck, p. 31, No. 6, without description) and a variety of the same as *carinifera*, Fér.,—all from Bourbon; *H. stylodon*, Bens. as *depressa*, Fér., from Mauritius; (compare Prod. No. 314) *H. pedina*, Bens. (A. and M. 1862, from Bombay) as *H. vitrinoides*, Desh. (Mag. de Conch. 1830), "collected at Bombay in 1835 by Dussumier"; and *Hyalimax Maillardi*, Fisch. as *Succinea unguicula*, Val., from Bourbon. There are also specimens marked as *H. ochroleuca*, Fér. (loc.?): an examination of pl. 30, fig. 1, Hist. des Moll., proved beyond doubt that this name was given to the Mauritian shell described Mr. H. Adams (P. Z. S., 1869) from our specimens as *H. rufozonata*; the Bermuda species must, therefore, receive a new name.

EXPLANATION OF THE PLATES.

Pl. VII.

- Fig. 1. *Mangelia fulvocincta*, p. 85.
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 3. *Clathurella apiculata*, Montr., p. 88.
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 7. ——— *Masoni*, p. 90.
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- Fig. 10. *Clathurella singularis*, p. 89.
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 17. — *Isseli*, p. 94.
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Pl. VIII.

- Fig. 1. *Eulima acunformis*, p. 98.
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 23. *Rissoina* (?) *abnormis*, p. 100.

XII.—List of Mammalia collected by the late Dr. STOLICZKA when attached to the embassy under SIR D. FORSYTH in Kashmir, Ladák, Eastern Turkestan, and Wakhán, with descriptions of new Species.—By W. T. BLANFORD, F. R. S., F. Z. S.

(Received July 30th ;—Read August 4th, 1875.)

The collections made by Dr. Stoliczka in Kashmir, Ladák, Káshghar, and Wakhán comprise a very fine series of mammalia, the description of which has been entrusted to me by Mr. Hume, who has undertaken the general direction, besides a large share in the details, of a work intended to be a memorial of our late friend. It is of course impossible to supply the place of the naturalist whose collections I shall do my best to describe, for with him has perished much knowledge of the habits and distribution of the animals, and although this want can be partially atoned for by the copious notes he has left behind, much unfortunately can never be replaced. In the present paper I shall merely give a list of the species of mammalia represented in the collections, with short characters of those which appear to be new, reserving all detailed descriptions for the larger work, in which it is intended to illustrate all the novelties and imperfectly known forms as fully as possible.

There is always more difficulty in procuring specimens of mammalia than in collecting terrestrial animals belonging to most of the other classes of vertebrata and invertebrata, and this is especially the case with the larger forms. It is consequently not to be expected that the species represented will be more than a portion of those inhabiting the country. Still the collection is rich in some respects, and especially in kinds of rodents, and it adds largely to our knowledge of the fauna of Western Tibet and Eastern Turkestan. The larger mammals indeed were originally better represented, but after Dr. Stoliczka's death many specimens appear to have been removed from the collection. Such at least was the case with the ruminants. In a private letter which Dr. Stoliczka wrote to me, he told me he had sent 22 skins of wild sheep from Káshghar. Of these only 11, 7 males and 4 females, are now forthcoming, and not one of these has fine horns. There is not a single specimen of *Ovis Poli* from the Pámir, the original locality, although I have reason to believe that Dr. Stoliczka brought away one head at least. Lastly, there are skeletons of wild sheep and ibex in the collection, of which the heads have disappeared. It is highly probable that other specimens besides those of *Ovis Poli* have been similarly made over to private individuals. The value of the collection for scientific purposes has been seriously diminished by its being broken up, and the finest specimens distributed, before it had been examined.



For convenience the country traversed may be divided into the Kashmir valley, Ladák, the Kuenluen range south of Yárkand (Karakásh valley, Sanjú Pass, &c.), the plains of Eastern Turkestan around Yárkand and Káshghar, the ranges north of Káshghar, being spurs from the Thian-shan range, the Pámir, and Wakhán.

The examination of the bats collected has been undertaken by Mr. Dobson, who will describe them separately.

INSECTIVORA.

1. ERINACEUS ALBULUS.—Plains of Eastern Turkestan.

2. SOREX (CROCIDURA) MYOIDES, sp. nov.

S. parvus, murinus, subtus albescens, pedibus albidis, pilis brevibus sparsis indutis, caudâ supra fuscâ, subtus albescente, setis brevissimis confertim annulatâ, pilisque longiusculis hic inde instructâ, auribus mediocribus, rostro subtus albido. Long. corporis cum capite 2.1, caudæ 1.5, pedis posterioris cum tarso 0.5, auris 0.22 poll. angl.

Hab.—Leh, Ladák.

CARNIVORA.

3. FELIS LYNX.—Skins purchased at Káshghar.

4. *F. sp.* near *F. pardinus* (? *Chaus caudatus*, Gray).—Skin purchased as Káshghar.

5. *F. UNCIA*.—Ladák; Pámir?

6. CANIS LUPUS.—Skins purchased at Káshghar.

7.* *C. sp. nov.* near *C. aureus* but larger.—Skin purchased at Káshghar.

8. *C. (VULPES) MONTANUS*.—Ladák (purchased); plains of Yárkand.

9.* *C. (VULPES)*, sp. immature.—Skin purchased at Káshghar.

10.* MELES, sp. nov.—Skin purchased at Káshghar.

11. MARTES FOINA ?—Skin purchased at Yárkand.

12. *M. sp.* (? *M. ABIETUM*, var.).—Skin purchased at Leh.

13. MUSTELA VULGARIS ? var.—Purchased at Yárkand.

RODENTIA.

14. PTEROMYS INORNATUS.—Kashmir.

15. ARCTOMYS AUREUS, sp. nov.

A. aureo-fulvus, dorso nigro lavato, capite antice fulvescenti-cano, maculo fusco ad rostri extremitatem signato, ventre interdum leviter ferru-

* These species are probably new but it is not thought advisable to propose names on the evidence of imperfect skins.

ginescente, caudâ tertiam partem corporis capitisque æquante, fulvâ, nigro breviter terminatâ ; pilis elongatis corporis omnibus ad basin fuscis. Long. a rostro ad basin caudæ circiter 18 (in corio dessiccato), caudæ vertebrarum 6, palmæ 2, plantæ fere 3, cranii 3·7 poll.

Hab.—Kaskasu pass between Yarkand and Sarikol, east of the Pámir.

This is a much smaller species than *A. caudatus*, which it resembles somewhat in colour, but it is never apparently so ferruginous beneath, nor so black above as are some specimens of the Kashmir marmot. The tail in *A. aureus* too is rather shorter in proportion. It appears to resemble *A. Hemachalanus* (Hodgson *nec* Anderson) but to be larger and different in colour. The skull shews distinctions from all these forms.

16. ARVICOLA BLYTHI.

Phaiomys leucurus, Blyth, J. A. S. B. 1863, XXXII, p. 89 (*nec Arvicola leucurus*, Gerbe).

Arvicola fuscescenti-fulvus subtus isabellinus, caudâ fulvâ, quartam partem totius longitudinis subæquante vel excedente, auribus rotundatis mediocribus, sparsim pilosis, palmis pentadactylis, ungue pollicari parvo obtuso, dentibus molariis similibus iis A. mandarini, molario ultimo maxillari postice magis producto, angulo interno postico ejusdem acutiore, dente anteriore mandibulari antice angulo fortiore interno munito. Long. sine caudâ 4—4·5, caudæ 1·25—1·35, cranii 1, auris 0·4, plantæ 0·8 poll.

Hab.—Ladák.

The genus *Phaiomys* of Blyth cannot, I think, be separated from *Arvicola*, as the only character of any importance, the presence of a claw on the rudimentary thumb of the forefoot, is found in many *Arvicolæ*, the common water rat, *A. amphibius*, amongst others. The name *A. leucurus* is objectionable in the present case as the species has not a white tail, and the same specific term had been previously applied by Gerbe to a vole inhabiting the French Alps, but considered by Blasius identical with *A. nivalis*.

17. ARVICOLA STOLICZKANUS, sp. nov.

A. supra læte fusco-rufescens, sive sordide ferrugineus, subtus albus ; vellere molli, longiusculo, ad basin schistaceo, palmis tetradactylis, plantis pentadactylis nudis brevibus, tarsis subtus pilis indutis, auriculis parvis e vellere haud emergentibus, rotundatis, caudâ quintam partem totius longitudinis subæquante, pilis fulvescenti-albidis setosis instructâ ; dente molario maxillari ultimo angusto, intus angulis duobus fortioribus antice, nullis postice, extus quatuor parvulis, duobus antice, ceteris postice, spatio interveniente, munito. Long. a rostro ad basin caudæ (in corio dessiccato) 4, caudæ 1, tarsi 0·7 poll.

Hab.—Nubra valley, Ladák ; Aktágh near Karakoram Pass.

In colour this species approaches *A. russatus* of Radde, but that is said to have the tail tawny above, and the teeth are described as very different. The last upper molar in *A. Stoliczkanus* is peculiarly formed, the anterior portion having two strong salient angles inside, and two very weak ones outside, this is followed by an elongate process with two slight angles outside and none inside, the whole tooth being much elongated.

18. NESOKIA INDICA.—Kashmir.

19. CRICETUS (CRICETULUS) PHÆUS, var.—Kuenluen range north of Sanju pass, Pámir, and Wakhán.

20. C. (CRICETULUS) FULVUS, sp. nov.

C. peraffinis Criceto phæo, sed major atque magis fulvus, arenaceo-fulvus vix cinereus. Long. corporis capitisque 4·5, caudæ 1·4, auris 0·75, tarsi 0·7 poll.

Hab.—Plains of Eastern Turkestan, Pámir, and Wakhán.

Another form of the *phæus* group of hamsters intermediate in size between *C. phæus* and *C. isabellinus*.

21. MUS CRASSIPES ?—Tankse, Ladák.

22. MUS PACHYCERCUS, sp. nov.

M. affinis *M. Bactriano*, sed minor, caudá brevior, crassiusculá, setosá, supra fusco-fulvus, subtus albidus, auribus ovalibus majusculis, pilosis, Long. (exempli in spiritu vini conservati) a rostro ad basin caudæ 2·3, caudæ 2, auris 0·5, plantæ 0·65 poll.

Hab.—Plains of Eastern Turkestan.

This is apparently the common house-mouse of Eastern Turkestan and differs from *M. Bactrianus* of Afghanistan, Persia, and North-western India, by having a shorter, thicker tail and a differently shaped and larger skull. The colour is sandy brown.

23. MUS SYLVATICUS, var.—Káshghar; Panja in Wakhán.

24. GERBILLUS CRYPTORHINUS, sp. nov.

G. supra rufescenti-arenaceus, subtus albus, coloris dorsalis ventralisque limite bene notato; rostro in lobum semicircularem intus pilis brevibus sparsis indutum, nares obtegentem, desinente; caudá corporis capitisque longitudinem excedente, cum dorso superne fere concolore, sed magis rufescente, nisi apicem versus, ubi nigrescit, subtus pallidiore, pilis nonnullis ad apicem caudæ longioribus nigrescenti-fuscis, auribus mediocribus, ovalibus, extus antice dense pilosis, mystacibus confertis, capitem longitudine parum

excedentibus, supremis nigris, cæteris albis; vellere longiusculo, molli, nitido, basin versus ad tergum schistaceo; palmis subnudis, pilis sparsis indutis, plantis confertissime pilosis; dente molario ultimo simplici, incisoribus unisulcatis. Long. exempli majoris nuper occisi a rostro ad basin caudæ 5·5, caudæ 6·25, auris 0·75, pedis posterioris a calcaneo 1·4 poll. Long. exempli minoris 4·5, caudæ 5 poll.

Hab.—Plains of Eastern Turkestan.

This form is distinguished from all others with which I am acquainted by the peculiar flap at the end of the snout covering the nasal apertures. This flap is semicircular in form, and hairy inside. I can find no description of a similar appendage in any other species, and there is nothing of the kind in *G. Indicus*, *G. Hurrianæ*, or in two undescribed species from Persia and Baluchistan, of all of which I have examined specimens preserved in spirits.

G. cryptorhinus is coloured like *G. meridianus*, but is of the same size as *G. tamaricinus*. From both the above species and from their ally, *G. collium*,* which inhabits western Turkestan, the present species is distinguished by the tail being longer than the body.

Another peculiarity of *G. cryptorhinus* is that the lachrymal bone appears never to be ankylosed to the skull. Consequently the process of the lachrymal which in all true *Gerbilli* projects into the anterior angle of the bony orbit, is frequently absent from the whole bone being lost. This was the case in two skulls which I examined.

25. *DIPUS LAGOPUS*.—Plains of Eastern Turkestan.

26. *LEPUS PALLIPES*?—Ladák.

27. *L. TIBETANUS*?—Nubra valley, Ladák.

28. *L. YARKANDENSIS*.

Günther, Ann. and Mag. Nat. Hist., September, 1875, 4, XVI, p. 229.

L. parvus, affinis Lepori tolai, sed multo minor, nusquam niger nec griseus, auribus usque ad apicem concoloribus, haud nigris, arenacco-isabellinus, fusco plusve minusve ad dorsum lavatus, lateribus lacteis, pectore pallidissime rufo, caudâ albâ, superne fuscâ; vellere molli, longiusculo, ad basin cinereo. Long. a rostro ad basin caudæ 17, capitis 3·6, caudæ 4, auris 4·25, tarsi 4·25 poll.

* For translations of the characters of this and of some other species described in Russian by Severtzoff in his *Turkestaniskie Jivotnie*, I am indebted to the kindness of Dr. Feistmantel. No translations are given in the "Zoological Record," and in the "Archiv für Naturgeschichte" even the names are omitted. It is greatly to be regretted that M. Severtzoff does not, like all the best naturalists amongst his countrymen, describe in a language more generally understood.

Hab.—Plains around Yárkand and Káshghar.

This species approaches *L. tolai*, Pallas, but is much smaller, with proportionally longer ears, and is chiefly remarkable for having no black on the tips of the ears, nor on the tail, and no grey tint on any part of the body.

29. *L. PAMIRENSIS*, Günther, l. c.

L. supra arenarius vel fusco-isabellinus, infra albus, uropygio albescenti-cinereo; caudá superne nigrá; aurium marginibus superioribus extus nigris; pectore pallido rufo; vellere denso, molli, ad basin, præter ventrali, cinereo; pilis longioribus ad dorsum nigro-terminatis, intermixtis. Long. a rostro ad basin caudæ circiter 18, caudæ 4, auris a basi anticá 5, ejusdem latitudo 2.75, cranii longitudo 3.5, tarsi 5 poll.

Hab.—Banks of Lake Sirikul, Pámir.

This is distinguished from the last by being somewhat larger, by having the ends of the ears and the upper part of the tail black, and by its grey rump. It is near to *L. Tibetanus* but differently coloured. The ears in the dry skin measure only 3.6 in. from the orifice and 4.5 from the head outside.

30. *L. STOLICZKANUS*, sp. nov.

L. præcedenti peraffinis, arenario-fulvus, differt tantum auribus multo longioribus, vellere dorsali nigro lavato. Long. corii desiccati a rostro ad basin caudæ 17.5, caudæ (vertebrarum) 3, ejusdem cum pilis apicalibus fere 5, cranii 3.5, auris extus 5.2, tarsi 4.9.

Hab.—Hilly country and Thian Shan mountains north-east of Káshghar.

This is rather darker than the preceding species and has much longer ears. When fresh the latter would probably measure over 6 inches. Both this and the last appear to have longer ears than *L. Lehmanni*, Severtzof, in which they are the same length as the head.

31. *LAGOMYS LADACENSIS*.

L. Curzonæ, Stol., J. A. S. B., 1865, XXXIV, Pt. 2, p. 108, nec Hodgson.

L. Ladacensis, Günther, Ann. and Mag. Nat. Hist., Sept., 1875, Vol. XVI, p. 231.

L. major, pallide cervinus, seu rufescenti-fulvus, dorso in æstate magis rufescente, auribus rotundatis, majusculis, extus ferrugineis, velleris dorsalis dimidio basali nigrescenti-plumbeo, apicali primum rufescente, tunc demum albescenti-isabellino, pilis nonnullis longioribus nigris ad dorsum intermixtis, ventre pedibusque pallide fulcis, capite antice rufescente, vibrissis supe-

rioribus nigris, inferioribus albis. Long. tota circa 9, cranii 2.25, auris 1, tarsi 1.5 poll.

Hab.—Ladák.

This is the common species of northern and north-eastern Ladák but not apparently of the mountains bordering the Kashmir valley. It is easily recognized by its peculiar pale fawn colour, more rufous in summer. It was first described some years ago by Dr. Stoliczka, who referred it to *L. Curzoniæ*. I had occasion subsequently to shew that the true *L. Curzoniæ* of Hodgson is a different species, and I have just heard from Dr. Günther, whilst this paper is passing through the press, that he has named the present form *Ladacensis*: I have consequently withdrawn the name I had proposed to give it. It is allied to *L. ogotona* by the form of the skull.

32. *L. AURITUS*, sp. nov.

L. superne sordide fulvus fusco-lavatus, capite humerisque rufescentibus, auribus magnis rotundatis, pilis isabellinis indutis, vellere molli, pilis basin versus nigrescenti-plumbeis, apices versus in dorso lateribusque isabellinis, fusco-terminatis, subtus albis. Long. (in corio dessicato) tota circiter 7.5, cranii 1.8, auris 1, tarsi 1.2 poll.

Hab.—Pangong lake, Ladák.

A larger form than *L. Roylei* with much larger ears. The colour in two skins from Lukung on the Pangong lake is smokey brown. The ears are as large as in the last species and must in the living animal be nearly $1\frac{1}{2}$ inches across.

33. *L. GRISEUS*, sp. nov.

L. sordide griseus, subtus albus, ad dorsum frontemque leviter rufescenti-lavatus, vellere elongato, molli, ad basin plumbeo-nigro, apices versus in dorso lateribusque griseo, apicibus ipsis nonnullis fuscis; auribus magnis rotundatis, pilis sparsis albidis indutis. Long. in exemplo nuper occiso 7, capitis 1.75, auris 1.4, tarsi 1.3 poll.

Hab.—Kuenluen range South of Sanju Pass.

I know of no other *Lagomys* which approaches this in colour. It is a peculiar grey, almost the colour of *Chinchilla*. The skulls of the last and present species approach in character to those of *L. Roylei* and *L. rufescens* but still exhibit well-marked differences.

34. *LAGOMYS MACROTIS*? Günther, l. c.—Kuenluen range?

The above is a wonderfully rich series of *Leporidae*.



UNGULATA.

35. *SUS SCROFA*, var. *NIGRIPES*.

Hab.—Thian Shan mountains near Káshghar.

The two specimens, male and female, closely resemble the European wild boar, but the legs are black, and there are some trifling cranial differences, which, although perhaps insufficient to justify specific distinction, are worthy of notice.

36. *OVIS HEINSI*?—Thian Shan mountains.

37. *O. NAHURA*.—Kuenluen range.

38. *CAPRA SIBIRICA*.—Kuenluen range and Thian Shan mountains.

39. *GAZELLA SUBGUTTUROSA*, var. *YARKANDENSIS*.

G. subgutturosa cornibus lyriformibus juxta caput subparallelis, lente divergentibus; facie fusco valde striatá.

Hab.—Plains of Eastern Turkestan.

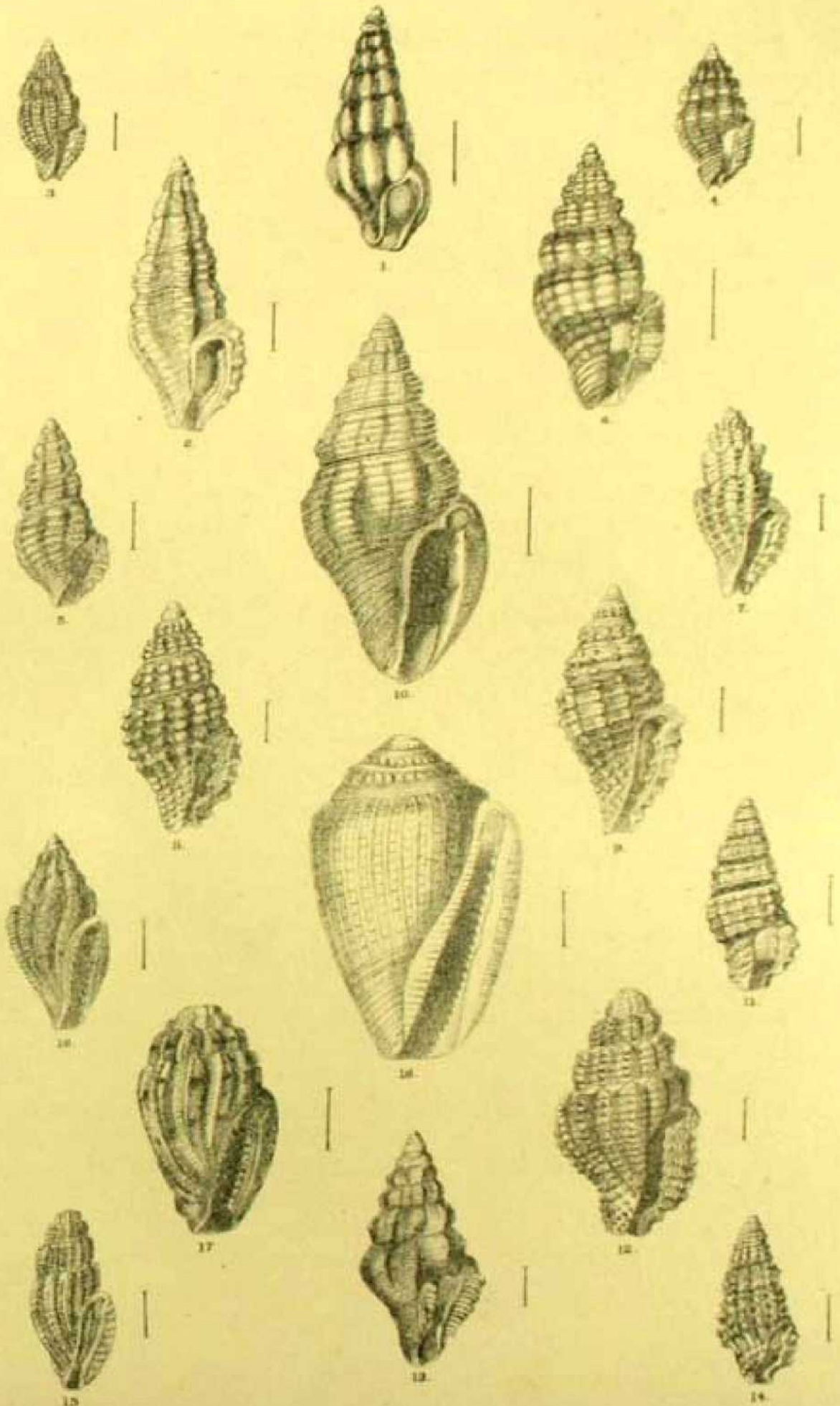
This differs much from the typical form of *G. subgutturosa*, the horns taking a much less open curve, and the face markings being much darker, but as intermediate forms are found in Persia, I do not separate it.

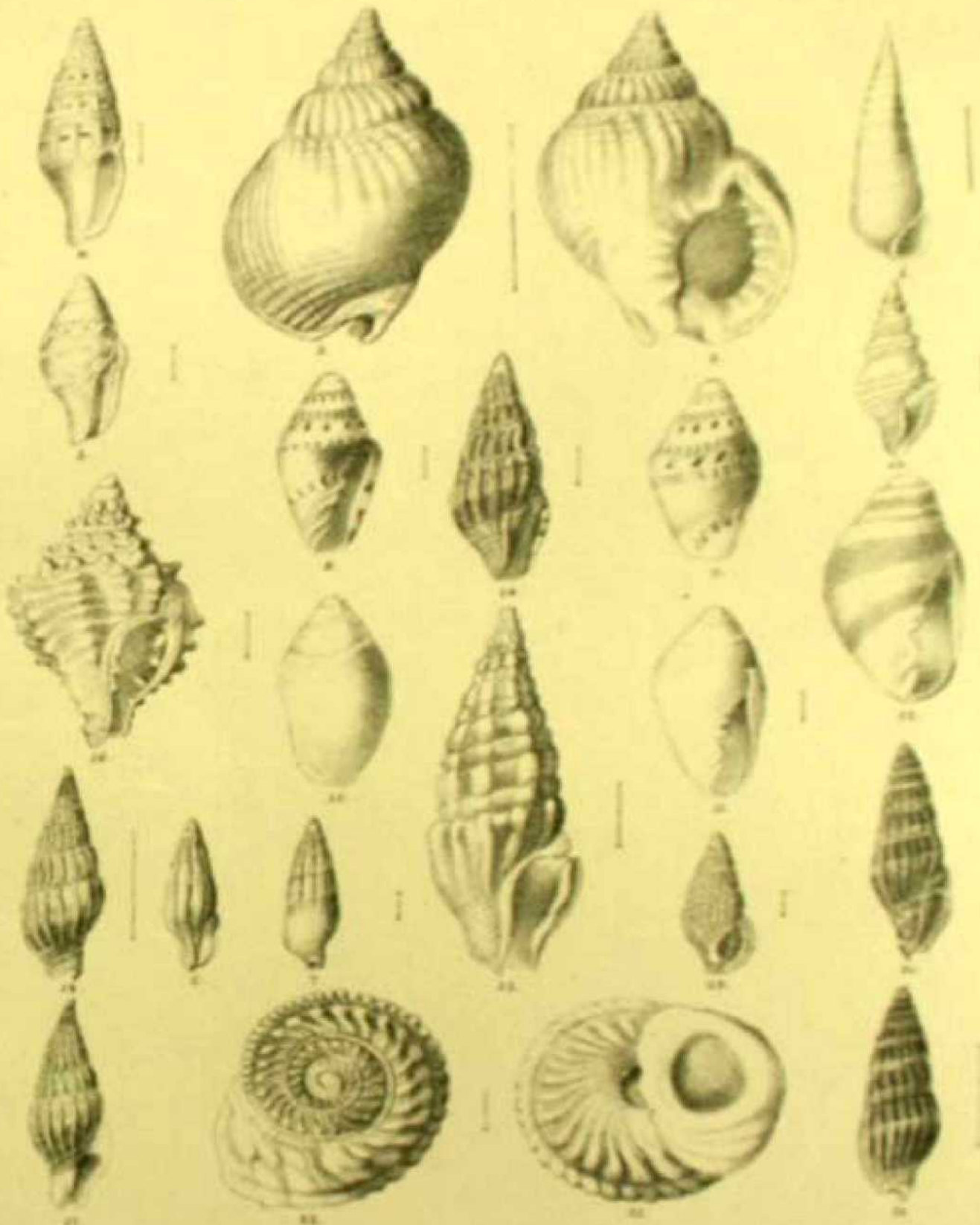
40. *PANTHOLOPS HODGSONI*.—Ladáak.

41. *CERVUS*, sp. (horns only)—? Thian Shan mountains N. E. of Káshghar.

42. *CAPRIOLUS PYGARGUS*? (horns only)—Káshghar?

P. S. *Sept. 28th.*—The number of the Annals and Magazine of Natural History for September, 1875, containing descriptions of several species of hares and *Lagomys* by Dr. Günther, was only received just before the last proof of this paper was passed. Although, under the rules usually adopted in England, the names given by myself would have priority, from having been given in a paper read before the Asiatic Society in August, I have thought it best to withdraw them, and to substitute those given by Dr. Günther, in order to obviate any risk of confusion in the nomenclature.







XIX.—*Note on (i) Elachistodon Westermanni, (ii) Platyceps semifasciatus, and (iii) Ablepharus pusillus and Blepharosteres agilis.*—By W. T. BLANFORD, F. R. S.

(Received Nov. 9;—Read Dec. 1, 1875.)

§ I.—A young snake was recently presented to the Indian Museum by Mr. G. Shillingford, of Purneah, and Mr. Wood-Mason, the Curator, asked me to determine it. For a long time I was unsuccessful, for the specimen presents the peculiarity of a pit behind the nostril, scales much like those of a *Bungarus*, except that the subcaudals are divided, and no poison fang; but after a good deal of research I at last identified the specimen with *Elachistodon Westermanni*, Reinhardt, Oversigt K. Dansk. Vid. Selsk. Forh. Kjobenhavn, 1863, p. 210 (Gunther, Rept. Brit. Ind., Appendix).

This snake is admirably figured in the original paper, and a remarkable character not mentioned in Dr. Gunther's description is shewn in the figure. This character consists in the presence of a post-nasal pit.

A loreal pit has been found in two other genera of harmless snakes, both West African; one *Bothrolycus* belonging to the *Lycodontidæ*, (Gunther, P. Z. S., 1874, p. 444, Pl. LVII, fig. B), the other *Bothrophthalmus* belonging to the *Colubridæ*. In *Elachistodon* the loreal shield is united to the nasal above and a suture runs from the edge of the pit to the labials below. In the original description the nasal was said to lie between two shields and the loreal was considered to enter the orbit, but there is certainly no suture above the nostril in the Purneah specimen and, considering the presence of the pit, I think that the lower præocular is not the loreal and that the homologies of the shields are as I have suggested.

From the character of the scales I am inclined to refer *Elachistodon* to the *Dipsadidæ*, and the dentition as described by Reinhardt agrees with this view, the posterior maxillary teeth being grooved. The following is a description of the specimen obtained.

Head scarcely broader than the neck, flat above, body somewhat compressed, tail rather short, pupil vertical, body surrounded by 15 rows of smooth scales, those on the sides as broad as long, the dorsal row enlarged, hexagonal, much broader than long. Nostrils lateral, each in a single shield, which contains a deep pit behind the nostril, the shield is divided below the pit, the suture running forwards to below the nostril and then downwards. Both palatine and maxillary teeth are present, but the specimen is too small for their characters to be made out. Ventrals 210, subcaudals in 65 pairs, anal undivided. Length $8\frac{1}{4}$ inches, of which the tail is 1.4.

Head-shields normal except that there is no separate loreal, this being united with the nasal above. Rostral twice as broad as high, just reaching the upper surface of the head. Anterior and posterior frontals equal in

length, the latter are broader and descend somewhat on to the side of the head so that the upper præocular is not in contact with the nasal. Vertical hexagonal, rather longer than broad, occipitals large, rather broad in front, 2 præoculars, the lower the larger, the higher not reaching the upper surface of the head; 2 postoculars. Upper labials 6 on one side of the head, 7 on the other, the 3rd and 4th entering the orbit, the last very large. Temporals 2, very long, the upper extending the whole length of the occipital, the lower rather shorter. Three pairs of enlarged chin-shields, the posterior separated by a small azygos scale, the second pair the largest, each being in contact with 3 lower labials. All the lower labials very narrow. *Colouration*:—a narrow white line runs along the back, it is straight on the tail, becomes wavy in the middle of the back, and tends to break up into spots near the head; sides dark brown with numerous minute elongate white spots tending to form cross bands; lower parts white, each ventral shield with a dark hinder edge, which frequently expands into irregular spots near the sides; upper surface of head blackish brown, suture between the occipital shields white, rostral and a broad line running from it over the outer part of the frontals and supraorbitals and across the temporals to the hindermost labial, and all the labials themselves, white, whilst a blackish brown band runs from the nostril to the temporals below the white line, and includes the eye.

§ II.—I had occasion recently to examine the type specimen of *Platyceps semifasciatus*, Blyth. It is a very young snake and has hitherto been a puzzle to Indian herpetologists, as may be inferred from the following synonymy:

Platyceps semifasciatus, Blyth, J. A. S. B., 1861, XXIX, p. 114; Günther, Rept. Brit. Ind. p. 237.

Coluber (Platyceps) semifasciatus, Theobald, Cat. Rept. in appendix to J. A. S. B., 1868, XXXVII, p. 52.

Comptosoma semifasciatum, Stoliczka, J. A. S. B., 1870, XXXIX, p. 188.

I venture with some diffidence to suggest that it is a young specimen of *Zamenis ventrimaculatus*, a snake with which I am very well acquainted from having found it abundantly in Persia, but which is not common in India except in the extreme west, and is necessarily not easily recognised in the young state except by one who knows its appearance well.

§ III.—On comparison of the scinque from Basrah which I described* as *Ablepharus pusillus* (A. and M. N. H. July, 1874, XIV, p. 33) with the type specimen in the Indian Museum of the species described by Dr. Stoliczka as *Blepharosteres a gilis*, I am disposed to believe that I was wrong in supposing them, on the strength of the descriptions, to be identical. They

* In this description a serious misprint occurs. The number of scales between the axils should be 36 not 26.

are congeneric without doubt, and *Blepharosteres agilis* is an *Ablepharus*, but it differs from *A. pusillus* in its much longer body. In *A. agilis* the fore limb does not nearly reach half way to the thigh and the hind limb barely reaches half way to the axil. In *A. pusillus* the fore limb reaches fully half way to the thigh or rather more and the hind limb two-thirds of the way to the axil. In the former the third and fourth toes of the fore foot are about equal in length, in the latter the third finger is decidedly the shorter. Under these circumstances I think it probable that *A. pusillus** is a distinct species and that *A. agilis* is probably distinct from *A. Brandti*, Strauch.

XX.—*The Evidence of past Glacial Action in the Nágá Hills, Assam.*

By Major H. H. GODWIN-AUSTEN, F. R. G. S., F. Z. S.

(Received July 25 ;—Read August 4, 1875.)

With Plates X—XIII.

When carrying on the survey operations in the Khási Hills, I was more than once led to think that glacial action had played a part in the denudation of some of the valleys ; but the traces of such action were so slight that I hesitated to notice them. However, when writing the paper on the West Khási Hills which was published in this Journal in 1869, I alluded to the subject, with reference to the valley near Mokarsa, under the Maotherichan ridge. When mapping the Jatinga valley, I met with lines of heavy subangular débris, skirting streams from the north side of the high ridge the west extremity of the Burraill running thence to Asálu. Under and to north of the peak of Mahadeo, there is a terminal mass of transported material near where the Naga village of Garilo formerly stood. On the north of the Shillong peak, the highest part of the Khási Hills, skirting the sides of the "Umshirpi" stream, are to be seen the remnants of deposits for which it is difficult to account, unless we bring in the agency of ice, or large melting snowbeds. The "Umshirpi" has cut a deep gorge through the altered sandstones below the point where the road from Cherra Poonjee crosses it, and here takes a very sharp bend ; since its original excavation, a bed of water-worn boulders has filled the valley, and caps the spur round which the stream winds, and is seen again in the road-cutting on the right bank quite 25 feet above the present stream, as one proceeds to the Artillery barracks from the station side, shewing clearly it was once continuous, and has since

* *A. pusillus* is figured in the 'Zoology of Persia,' Pl. XXVII, fig. 1.

been removed. Such a bed of transported material would again be found at this point, if large snow beds, or small glaciers were to be formed on the slopes of the Shillong peak, where the Umshirpi takes its rise, so as to produce a greater aqueous action, and sudden rushes of water. Yet I did not consider myself quite justified in attributing such appearances to more than the former greater intensity of aqueous action alone, especially on so low a latitude as $25^{\circ} 30'$.^{*} However, during my last expedition into the same range further east, where it rises to nearly 10,000 feet, it was highly interesting to find the most unmistakeable signs of former considerable glacial action. By any one who has traversed a glaciated region, the slightest evidence of such action is at once detected, which to the uninitiated eye might escape notice, but the moraines of the Burrail are of such dimensions, and so partake of all the characters of glacial action having once been in full force, as to strike the most unobservant as being peculiar. Rounding the base of the Burrail on the direct road from Sámágúting towards Munipur, after passing the village of Suchéma under the curiously shaped and conspicuous scarp of Sú-vé-nú-chi-ká, descending into the deep valley of the Zubza, on viâ Jotsáma and Phésáma, Kigwéma is reached, and shortly after coming in view of this last village, the path leads up the steep terminal slope and on to the level surface of the old moraine, on which our camp was soon pitched at an elevation of 5000 ft. The imagination could picture the time when the deep valley at the back, above which towered the cliffs and peak of Japvo (the point we had to ascend and observe from), was filled with the ice that had pushed and carried the large blocks of stone and earth forward. The summit of Japvo, a trigonometrical station, is 9,890 ft. above the sea, and the mean height of this eastern part of the Burrail, which here takes a bend to the south, is about 9,000. The Tertiary rocks, which first begin to rise above all the surrounding country near Asálu, dipping S E, continue, with a gradual elevation of the base of the series for 50 miles, until they attain their highest elevation near Japvo; the south-easterly dip changes gradually round to west, and presents a precipitous face at right angles to the direction of the main watershed:—the continuity of the Burrail as a high range is thus reduced suddenly from 9,000 to 5,000 feet, and the much older contorted clay shales and schists on which the Tertiary rocks unconformably rest are exposed. Along this east face there are several deep gorges, their streams joining the Zullo, which rises under the peaks of Ténépú and Khunho. Across the low saddle of the older series, which has a breadth of 5 miles, the newer rocks again come in, with a reversed dip, at Tellizo, and its base rises again towards the N E,

^{*} Dr. Wm. Hooker has noticed the glacial features in the Atlas Mountains; and Palgrave again south of the Caspian in lat. 36° .

forming with that strike the Kopamedza range. This sudden depression in the range, marked by the removal of the Tertiaries, stretches far away to the south, into the depression of the valley of Munipur, which is in fact the continuation of the same great lateral axis of elevation. The high N N E, S S W ridge of Tertiary sandstones, rising 7000—8000 feet, bounds the valley of Munipur for 80 miles, and marks its eastern boundary, coming in again at the Máphitel ridge, which bounds the valley on the east.

It is in the gorges draining to the Zullo river that the best examples of glacial action are to be seen, the moraine in the Gaziarurh being the largest. The tributaries of the Mazierh ravine under Japvo are numerous, and fall very suddenly from the ridge above; descending from the peak into the gorge, just below where they unite, and leaving the more confined part, and proceeding down the valley, the first signs of ice-action consist of narrow irregular terraces; until arriving at a lateral ravine at the north side of the valley, where a clearly defined small moraine projects out into the main valley of the Mazierh, to the level surface of its moraine, and would (when the glacier existed) have formed one of those little side lakes, so often seen in glaciated ground, just above the point of junction with a lateral and main glacier. Passing this side ravine, the path led along the flat surface of the moraine for half a mile, which widened gradually as the valley opened, and we then descended 200 feet into the bed of the stream. Enormous blocks shew out on the sides of the even-cut slope at an angle of 45°, and also lie near and in the bed of the present stream, the face of the slope being here very straight. The sketch (Pl. X) taken looking up the valley and one of the lateral moraine (Pl. XII, Fig. 1) will elucidate this feature. Just in a direct line opposite Kigwemah, the moraine ends at 4 miles from its source, with a terminal slope of 45°, and the stream descends rapidly to join the Zullo about 7 miles further down. The débris composing this mass of transported material having been derived from Tertiary sandstones all more or less soft, which have quickly broken up and become disintegrated, much of it must have been reduced to a state of mud and sand long before it arrived at Kigwemah, and hence it is that these moraines of the Naga Hills differ from those of the Himalaya and Alps, where the rocks are of various kinds, and often extremely hard, retaining their angular forms after travelling for a great distance. The level surface of the Mazierh moraine is now cultivated and terraced for the rice irrigation, and the sub-angular blocks and stones that formerly covered the surface have been used to build the walls of the terraces; the former distribution on the surface has thus been effaced, yet here and there collections of stones too large and heavy for removal by man still remain to shew that they moved down in the usual continuous line.

Proceeding south from Kigwémah, and reaching the next gorge at Zakameh, the scenery near it is most lovely, and the old moraine features

are very well displayed. At the point where the stream, the Gaziarurh, leaves the gorge, the broad flat expanse commences and extends down the valley for quite $1\frac{1}{2}$ miles. After proceeding down and crossing it, the view from the next spur on the other side was most striking: the broad sweep of old moraine a quarter of a mile broad (terraced for cultivation) comes bending round to join the smaller one from the Kurúrurh; the two glaciers must have once met here, and the terminal cliff would have been just below the junction; the elevation is here 5,100 ft.* I give a sketch of the moraine on Pl. XIII. The views on all sides were lovely, especially that up the gorge of the Gaziarurh: the soft hazy rays of light cast by the sun, setting behind the high range on the west, brought out in most lovely grey tones the receding steep spurs that bounded the glen.

Towards the upper part of the Zúllo near where the Kaburhi joins it, traces of old terraces of transported material are observable, and huge blocks of sandstone are seen here and there, all in the same level, resting on the clay shales (one of these blocks at about 4,800 ft. measured $20 \times 18 \times 12 = 4,320$ cubic feet), and it is from among these transported blocks that the Nagas of Sopvumah select the monoliths and dolmens they erect in the villages along the crest of the ridge above, which is of clay shales.

Crossing the main watershed at its lowest part, we descend gradually to the head of the Barak valley, the physical aspect of which well deserves notice (Pl. XI). The river, here 3,800 ft. above sea level, flows with a very serpentine course through a broad level belt about $\frac{1}{4}$ to $\frac{1}{2}$ a mile in breadth, the greater part of which is or has been under rice cultivation. There are scarcely any trees on the hill slopes, and those few that exist are confined to patches on steep slopes bordering the river, where it bends in under the hills. Alluvial terraces are well developed both in the main valley and lateral branches. Under the village of Gnámih, the main accumulation of these deposits terminates, and below this they occur, now on one side of the valley, now on the other, extending into the narrow gorge of the river still further down where it takes a sharp loop-like bend of 6 miles, and it is evident that they once filled this gorge to a height of 130 feet; little, however, of the deposit is now left. In the more open part above, the upper level of the terraces is about 120 feet above the present level of the Barak, and they consist of strong coarse conglomerates and clay. The age of these

* This altitude may be considered very low, when we know that the extension of similar action is not seen much below 4000 ft. in the N. W. Himalaya, on a more northern latitude; but there is every reason for supposing that during the last glacial period the general distribution of land and water was nearly the same as at the present time, and that the amount of moisture borne from the south and south-west must have then been very great, producing an enormous snow-fall deepening the valleys and forcing the glaciers to a lower level.

deposits there is every reason for supposing to be the same as that of the Japvo moraines, the result of a powerful river action, due to a heavy winter snow-fall,—all the main sources of the Barak lying in lateral valleys of the Kopamedza ridge at an elevation of 7—8,000 feet.

The character of the valleys that drain away through Manipur and eventually into the Irawadi, is intimately due to former effects of climate, during the period the changes I have above described were going on. These valleys and Manipur have at one time presented the appearance of a chain of lakes, now dry, the only remnant in Manipur itself being the Loglak Lake, now of small dimensions; a description of one such tributary valley will suffice for all,—and I am informed by Dr. J. Anderson that like characters are to be seen in the country towards Yunan. On the water-parting of the Irawadi and Súrmah, one looks down on the Khongba flowing with sharp bends through a broad almost level valley. The steep slopes from the Kouprú ridge on the west terminate some two miles from the base of those on the east, and a very gradual nearly level surface of water-worn detritus covers the intermediate ground, through which run four streams from the ridge above-mentioned.

The valley on the east is bounded by a low ridge of only some 300 feet above its bed, which gives off to the east spurs rising to 1000 feet. Further down the valley, 6 miles from the watershed at Kaital-Mambi, a collection of detritus (mostly angular) forms a terrace about 50 feet above the stream, and is the termination of the long talus given off by the deep ravines on the flank of the Koupru peak, which here rises to feet some feet higher than the ridge to its north. This talus extends close up to the eastern side of the valley and undoubtedly at one time abutted on its eastern spurs forming a lake above, subsequently drained by the stream cutting its way round their present base, a process which would have commenced directly the formation of talus from Koupru ceased with the change into present climatic conditions.

A sketch (Pl. XII, Fig. 2) of the Kaital-Mambi lake bed from the watershed is given in illustration of the above features.





XXI.—*Note on a large Hare inhabiting high elevations in Western Tibet.*—By W. T. BLANFORD, F. R. S.

(Received. Nov. 8;—Read Decr. 1, 1875.)

In the list of mammals obtained by Dr. Stoliczka in Ladák, Eastern Turkestan, &c. (ante, p. 109), I included a hare from Ladák under the name of *L. pallipes*, but as I felt doubtful of the identification I added a note of interrogation to the name. I have since, in a collection of skins very kindly sent to me for examination by Mr. Mandelli of Darjiling, found one young and two adult specimens of a hare with an ashy grey rump, corresponding very much better with the figure and description of *L. pallipes* given by Hodgson (J. A. S. B., 1842, XI, p. 288, Pl. 3). This hare is doubtless the kind inhabiting the portions of Tibet immediately north of Sikkim, and seen by myself in Sikkim close to the frontier at the Kongra Lama pass (J. A. S. B., 1872, XLI, p. 34). It differs in several respects from the large hare of Ladák and Western Tibet, referred first, I believe, by Blyth in his 'Catalogue of the Mammals in the Museum of the Asiatic Society,' p. 131, and subsequently by myself to *L. pallipes*. The hare from Western Tibet is a larger form with proportionally shorter and differently coloured ears, the fur is less woolly, the colouration more rufous on the back, and less ashy on the rump, the dark band on the anterior surface of the ears is much less distinct and the posterior outer surface shews far less white, and the tarsi are clad with longer and denser hair. I propose to name this Western Tibetan hare, from the extremely elevated regions which it inhabits,

LEPUS HYPHIBIUS, sp. nov.

L. major, rufescens, nigro-adumbratus, subtus albus, uropygio fuscescenti-griseo, caudâ floccosâ, omnino albâ, vellere dorsali densissimo suberispato, auribus breviusculis, capitem longitudine parum excedentibus, antice extus fusco rufescentibus, postice albescentibus vel albis. Long. corporis cum capite in corio dessicato ad 24 poll., tarsi 5, auris a capite 4.5, cranii 3.6.

HAB.—*In vallibus altissimis planitiebusque provinciæ occidentalis Tibetanæ Ladak dictæ.*

Description taken from a specimen collected by Dr. Stoliczka at Kium in the Changchenmo valley, 15,500 feet above the sea, in October. Colour rufous brown more or less mixed with black on the back, dusky ashy on the rump, lower parts white with a slight rufescent tinge. Fur long, woolly rather curly and thick; on the anterior portion of the body the hairs are about $1\frac{1}{4}$ inches long, ashy at the base, further back the basal portion becomes creamy white, beyond the middle of each hair there is a blackish ring, then a pale brown one, the extremity being black. Towards the rump, the hairs are

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fully two inches long, and for the most part ashy grey throughout, a few only having short black tips. On the sides the hair is rufous brown, except at the base, where it is ashy, on the lower parts white with a slight rufous tinge throughout. On the neck the hairs are rufous brown, those on the back of the neck having ashy tips; on the breast they are paler rufous. Head brown, whitish round the eyes, whiskers partly black, partly white; inside surface of ears brown in front, whitish behind, the brown hairs having short black tips, no distinct dark band in front. Extreme tip of ears black, the colour only running a short distance down each margin. Ears inside clad, towards the tip and posterior margin, with buff hairs, a brown band near the hinder margin, which is buff. Tail white throughout. Limbs chiefly white, a brownish band running down the anterior portion of the fore legs.

The skull measures 3·63 inches long from the occipital plane to the front of the incisor teeth, and 1·73 broad across the widest portion of the zygomatic arches.

This hare appears to be found throughout a considerable tract in Western Tibet. The specimen in the Asiatic Society's collection was presented by Captain Smyth, but has no precise locality. This species is probably the *L. oiostolus* of Adams, P. Z. S., 1858, p. 520. I do not think it is the *L. oiostolus* of Hodgson, for a young specimen of *L. pallipes* agrees much better with Hodgson's description, and the ears in the former are said by Waterhouse* to be coloured like those of *L. Tibetanus*. This is not the case in *L. hypsibius*.

XXII.—*On new or little-known species of Phasmidæ, with a brief preliminary Notice of the Occurrence of a Clasp ing Apparatus in the Males throughout the Family.*—By JAMES WOOD-MASON.

(Reed. Decr. 10th, 1875;—Read Jan. 5th, 1876.)

(With Plates XVI & XVII.)

LONCHODES WESTWOODII.

♀ *Bacillus Westwoodii*, Wood-Mason, J. A. S. B., Vol. XLII, 1873, p. 51, pl. V. figs. 1, 2; P. A. S. B., July, 1873, p. 149, and A. & M. N. H., 4th Ser., 1873, Vol. XII, p. 348.

♂. Body and limbs, especially the anterior pair, of excessive tenuity; the average width of the former not exceeding three-fourths of a line. Antennæ filiform, 22-jointed, all but as long as the five basal abdominal segments taken together. Head a complete miniature of that of the female,

* Rodentia, p. 62.

being similarly armed with two minute spiniform tubercles. Meso- and metathorax dilated at the insertion of the legs. Abdomen exactly half the length of the body; terminal dorsal segment strongly carinate, its posterior and inferior angles produced into slender deflexed processes in contact at their tips only, which, like the sides of the resultant hiatus, are beset with minute spinules; terminal ventral segment pointed, carinate below for its posterior two-thirds. Legs simple except for the presence of minute representatives of the triangular spines seen near the apex of the femora in the opposite sex; their relative length 1, 3, 2.

Total length, 3 in. 4 lin.; head, $1\frac{1}{2}$ lin.; proth., $1\frac{1}{4}$ lin.; mesoth., 9 lin.; metath., $7\frac{1}{2}$ lin.; abd. $16\frac{1}{2} + 4 = 20\frac{1}{2}$ lin.; antennæ, 14 lin.; fore femora, 17, tibiæ, $20\frac{1}{2}$, tarsi, $6 = 43\frac{1}{2}$ lin.; inter. femora, 11, tibiæ, 12, tarsi, $4 = 27$ lin.; post. femora, 13, tibiæ, 16, tarsi, $4\frac{1}{2} = 33\frac{1}{2}$ lin.

HAB. The above description is taken from a specimen preserved in alcohol captured on South Andaman by Mr. A. de Roepstorff.

LONCHODES AUSTENI, n. sp.

♂. In size, thickness, and armature like the *Acanthoderus Wallacei* of Westwood, but without the lateral spines and with a longer head and more prominent eyes; antennæ long and setaceous; head, pro- meso- and metanotum with a few minute granules, especially on the edges of the two last named; meso- and metathorax carinate above and below; the mesonotum, both divisions of the metanotum, and the abdominal segments armed with an erect spine at their extreme hinder ends, the abdominal spines gradually decreasing in size backwards so as to become almost imperceptible tubercles on the two penultimate segments; terminal ventral and dorsal abdominal segments much as in *L. luteoviridis*. Intermediate and posterior femora with two minute spines near the apex below; relative length of the legs 1, 3, 2, the posterior being very little shorter than the anterior pair.

Female unknown.

Total length, $2\frac{1}{2}$ in.; head, $1\frac{3}{4}$ lin.; proth., $1\frac{1}{2}$ lin.; mesoth., $7\frac{1}{2}$ lin.; metath., $4\frac{1}{4}$ lin.; abd., $12 + 3 = 15$ lin.; antenn., $20\frac{1}{2}$ lin.; fore fem. 10 lin., tibiæ, 12 lin.; interm. fem. $7\frac{1}{2}$, tibiæ, 8 lin.; post. fem. 9 lin.; tibiæ, 12 lin.

HAB.—Dikrang Valley, Assam; collected during the Daffa Expedition, by Major H. H. Godwin-Austen, after whom I have much pleasure in naming it.

PHIBALOSOMA WESTWOODII, n. sp.

♀ Very closely allied to *P. Cantori*, from which it differs in the great development of the lateral lobes of the 6th dorsal abdominal segment, and in the form of the head, the occipital region of which is broad, high, and convex, and surmounted by two rounded tubercles of very unequal size

that of the right side being by far the larger; minute scale-like rudiments of tegmina and wings.

Total length, 9 in. $4\frac{1}{2}$ lin.; antennæ, 1 in. $7\frac{1}{2}$ lin.; head, 7 lin.; prothorax, $5\frac{1}{2}$ lin.; mesothorax, 1 in. $9\frac{1}{2}$ lin.; metathorax, 1 in. $3\frac{1}{2}$ lin. abdomen, 4 in. 1 lin. + 1 in. $2\frac{1}{2}$ lin. = 5 in. $3\frac{1}{2}$ lin.; breadth of 6th abd. segment at base, $3\frac{1}{2}$ lin., of the same at apex, $8\frac{1}{2}$ lin.

Male unknown.

HAB. Nazeerah (Foster) and Samaguting (J. Butler), Assam.

I have much pleasure in naming this gigantic insect after my friend and former teacher Professor Westwood, Hope Professor of Zoology in the University of Oxford.

LOPAPHUS IOLAS, Westw.

♂ *Necroscia Iolas*, Westw., Monograph of Phasmidæ, p. 145, pl. xix, fig. 2.

♀. Much stouter than the male, about the same size and thickness, and relative proportions as *Bacteria Baucis*, but with the mesothorax narrowed in front; head, and pro- and mesonotum with scattered granules; legs armed as in the male; tegmina in the form of small closely appressed overlapping scales; not the faintest trace of wings; terminal dorsal abdominal segment and operculum much as in *Bacteria Baucis* and *Lonchodes Bootanicus*.

Total length, 4 in. $6\frac{3}{4}$ lin.; head, $2\frac{1}{2}$ lin.; proth. $2\frac{3}{4}$ lin.; mesoth., 13 lin.; metath., $5\frac{1}{2}$ lin.; abd., 2 in. $2\frac{3}{4}$ lin. + 5 = 2 in. $7\frac{3}{4}$ lin.; antenn., 3 in. 5 lin.; tegmina, 2 lin.

The following are the admeasurements of a specimen of the male:

Total length, 3 in. 2 lin.; head, $1\frac{1}{2}$ lin.; proth., $1\frac{3}{4}$ lin.; mesoth., 8 lin.; metath., 4 lin.; abd., $18\frac{1}{2}$ + $3\frac{1}{2}$ = 22 lin.; antenn., 2 in. 9 lin.; tegmina, $2\frac{3}{4}$ lin.; expanse of wings, 2 in. 11 lin., or reaching as far as to the apex of the 4th abdominal segment.

HAB.—Johore, in the Malay peninsula, and Sinkieb Island, off the N. E. coast of Sumatra, where the specimens were taken by my native collector. Professor Westwood's *Necroscia Iolas* was from Malacca.

Were it not for the presence of wings in the male and of rudimentary tegmina in the female, this species would have to be placed next to *Lonchodes porus*, Westw., the female of which will, I feel confident, prove to be either *Lonchodes Bootanicus* or *Bacteria Baucis*, or at any rate some closely similar form. It is placed, provisionally, in the genus *Lopaphus*, because the nearest winged ally of the female is indubitably the *Lopaphus brachypterus* of De Haan; but it might also have been ranged with the *Phibalosomas*, the females of some of which have minute scale-like rudiments of organs of flight, in the shape of mere adnate processes of the dorsal integument of the meso- and metathorax.



PHYLLIUM SICCIFOLIUM.

Having never met with a specimen of this species in the numerous collections that have been submitted to my inspection since my arrival in this country, but having received one from Mauritius, I am forced to the conclusion that it is confined to Mauritius and some of the neighbouring islands, and that the specimens from Java, Timor, and New Guinea referred to it by De Haan have, as Westwood has suggested, been incorrectly determined. The latter author states that "in the Hopeian collection at Oxford there is one from the collection of Latreille with the locality "Seychelles" attached to it in his handwriting": the locality now given thus corroborates that of the celebrated French entomologist.

PHYLLIUM CELEBICUM, DeHaan, Pl. XVI.

Some time ago I received, through the kindness of the hon'ble Ashley Eden, to whom the Indian Museum has many times been indebted for valuable specimens, two examples—the one an adult female, the other a pupa of the same sex,—of a species which I have been unable to distinguish from the above, the adult specimen only appearing to differ from De Haan's typical one from the island of Celebes in the greater length of its tegmina and wings, but in the latter respect very nearly agreeing with a specimen from Manilla in the Hope Collection at Oxford.

The following are the admeasurements of Mr. Eden's adult specimen:—

Total length, 3 in. 3 lin.; head, $3\frac{1}{2}$ lin.; proth. $2\frac{1}{4}$ lin.; mesoth., $3\frac{1}{2}$ lin.; metath., $4\frac{1}{4}$ lin.; abd., 1 in. 7 lin. + 6 lin. = 2 in. 1 lin.; width of 3rd abd. segm. at middle, 1 in. 3 lin.; do. of 6th at base, 1 in. $2\frac{1}{2}$ lin.; do. of same at apex and of 7th at base, $8\frac{1}{2}$ lin.; length of wings 1 in. $7\frac{1}{2}$ lin., or reaching to apex of 5th segm.; do. of tegmina, 2 in., or nearly to apex of 6th; width of do. 8 lin.; width of post. lobe of ant. fem. $3\frac{1}{4}$ lin.; do. of ant. lobe, $2\frac{1}{4}$ lin.

HAB.—Karen country, Burmah.

The fourth abdominal segment of the pupa is biocellated, as in the male, but not the faintest trace of these ocelli is detectible in the perfect insect.

PHYLLIUM WESTWOODII, n. sp., Pl. XVII.

♀. Legs all similar to those of *P. siccifolium*; wings reaching as far as to a little beyond the second abdominal segment; the tegmina to the apex of the sixth; mesothorax granulated above and below and at the sides; abdomen gradually widening from the base to the angulation which occurs a little beyond the middle of its third segment; from this point narrowing, at first very gradually, at last somewhat more rapidly to the apex of the 6th so that its sides are slightly and regularly arcuate; its three terminal segments forming together a triangular mass, the sides of the seventh

slightly concave; the operculum reaching almost to the apex of the basal third of the terminal dorsal segment.

♂. Legs all exactly as in the female; the antennæ, which are tomentose, as long as the wings, and composed of 26 very distinct joints, all produced into a point below at apex, when laid back reach quite as far as to the apex of the 4th abdominal segment; the tegmina extend to the middle of the 2nd, the wings to the apex of the 7th abdominal segment. Abdomen, at first very slightly and gradually, then more suddenly widening to a little beyond the middle of the 3rd segment; thence maintaining the same width to apex of 4th, whence at first very gradually and afterwards more suddenly narrowing to its extremity, the sides being slightly arcuate; a faintly marked pair of ocelli on the posterior half of 4th segment; the three terminal ventral segments carinate below, the last of them broadly rounded at the tip and barely reaching the level of the end of the basal third of the terminal dorsal one.

♀. Total length, 4 in.; head, 4 lin.; proth., $3\frac{1}{4}$ lin.; mesoth., $5\frac{1}{2}$ lin.; metath., 6 lin.; abdom., 2 in. + $7\frac{1}{2}$ lin. = 2 in. $7\frac{1}{2}$ lin.; breadth of 3rd segm. abdom. at angulation 20 lin.; do. of 6th at base, 1 in. 4 lin.; do. of 6th at apex, $10\frac{1}{2}$ lin.; width of post. lobe of ant. fem 3 lin.; do. of ant. lobe, $2\frac{1}{4}$ lin.; length of tegmina, 2 in. 7 lin., width of do. 10 lin.; length of wings, 1 in. 2 lin.

♂. Total length, 2 in. 9 lin.; head, 2 lin.; proth., $1\frac{3}{4}$ lin.; mesoth. (measured below), $3\frac{1}{4}$ lin.; metath. (measured below), $4\frac{1}{2}$ lin.; abd., 1 in. $5\frac{1}{2}$ lin. + $4\frac{3}{4}$ lin. = 1 in. $10\frac{1}{4}$ lin.; breadth of do. at base 4 lin.; of 3rd segt. at angulation, $8\frac{1}{2}$ lin.; of 5th at apex $7\frac{1}{2}$ lin.; of 6th at apex 5 lin.; length of tegmina, $10\frac{1}{2}$ lin.; of wings, 2 in.; of antennæ, 2 in.

All the above measurements are taken from alcoholic specimens.

HAB.—The female from South Andaman, where it was captured by Captain Protheroe on his dining table, so that the females of this species must possess some considerable powers of flight. The insect which I confidently believe to be the male of this species was taken by Mr. W. Davison, near Pahpoon, about 150 miles north of Moulmein, in the Salween country. The acquisition of a male from Port Blair or of a female from Burmah will alone decide whether these two insects have been legitimately paired or not.

The female differs from that of *P. siccifolium* in having tolerably well-developed wings instead of minute scale-like rudiments of such, in the shape of the abdomen, in which three instead of two segments go to form the triangular termination, and by its less strongly serrated mesothorax; and from that of *P. Celebicum* in the form of the external lobes of the fore femora, which are semioval instead of angulated, and notably in the form of the abdomen; in which latter point the male differs most conspicuously from that of the same species.

I take this opportunity of stating that the terminal dorsal abdominal segment in the males of all the species belonging to this family of Orthopterous insects with the exception of those of the genus *Phyllium* is modified to serve as a more or less efficient clasping apparatus. In its simplest form, this consists of a number of very minute highly indurated dark brown spinules developed upon the under surface of the segment near its hinder margin (*Bacillus hispidulus*, W.-M., etc.); very frequently, however, the whole segment is so profoundly modified as to constitute a regular forceps (most species of *Lonchodes*, *Phibalosoma hypharpax*, *Podacanthus Typhon*, etc.), the arms of which are in contact throughout their length and beset internally with interlocking teeth, or in contact and spined at their extremities only; these extremes of simplicity and specialization being connected by every conceivable gradation. In correlation, the anal cerci, which are invariably straight in the females, are curved and decussated. But neither has this condition of the anal cerci been hitherto recognized as appertaining exclusively to the male sex, nor have the structures to which a prehensile and retentive function is now for the first time assigned been interpreted, although both have been figured and described in numerous species by Professor Westwood and others.

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ADDITIONS AND ERRATA.

Page 135, 16 lines from bottom of page, for "Geoff." read "Griff."

Page 136, 6 lines from top of page, for "its," read "it."

Page 151, 8 lines from top of page, for "*Conspectus of species*," read "*Conspectus of genera*."

Page 161, 13 lines from bottom of page, for "*monotana*," read "*montana*."

Page 170, 6 lines from top of page, for "*Conspectus of species*," read "*Conspectus of genera*."

Page 180, 19 lines from top of page, beneath the word "SAPINDACEÆ," insert the words "*Conspectus of genera*."

Page 198, 6 lines from top of page, for "Upper Assam," read "Upper Tenasserim."

Page 112, 9 lines from bottom of page, for CAPRIOLUS, read CAPREOLUS.



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“ It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease.” SIR WM. JONES.



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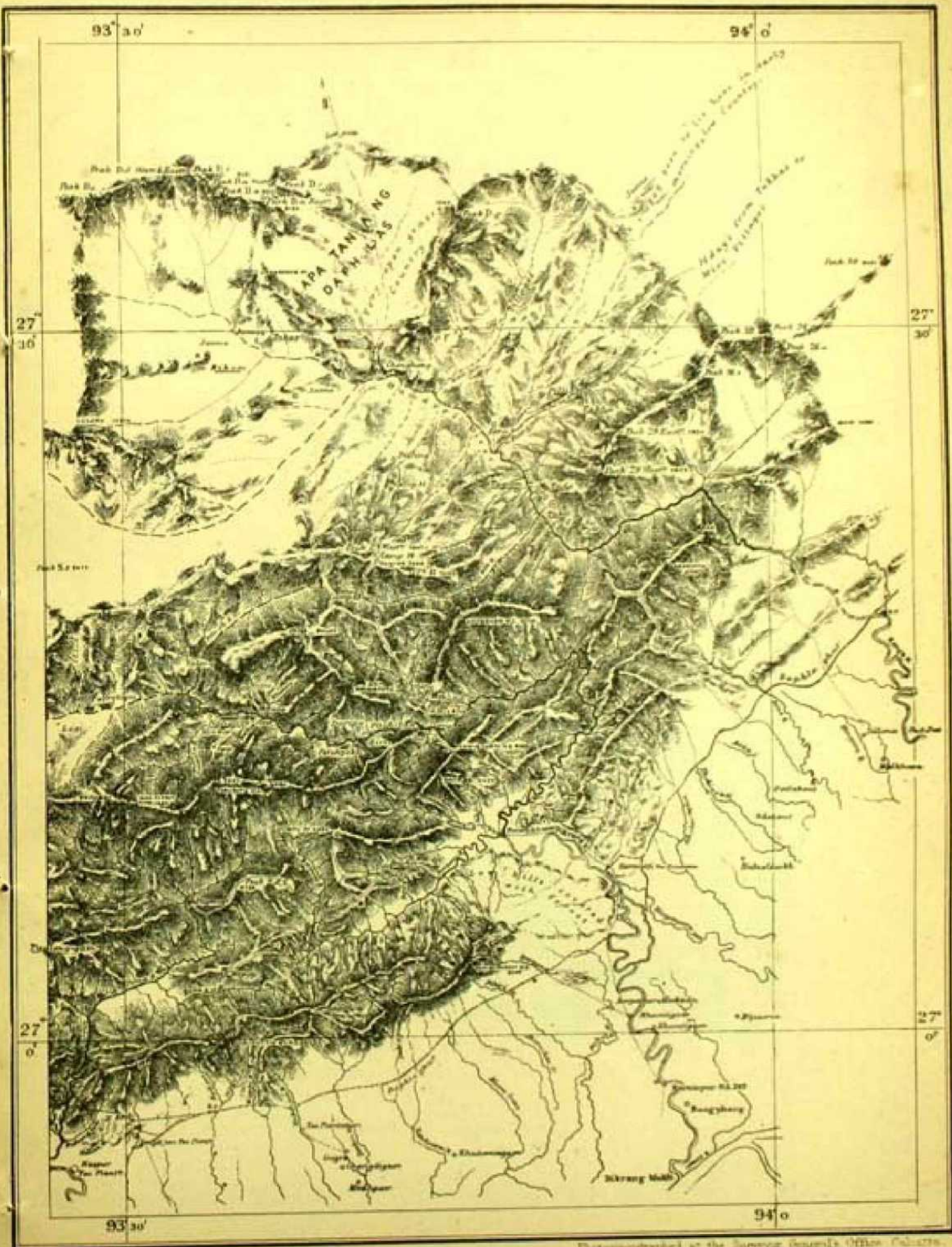
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Photocopy made at the Surveyor General's Office, Calcutta.

# MAP OF PART OF THE DAFLA HILLS

Illustrating Major Godwin-Austen's paper on the Geology of the Dafla Hills.





*Lithographed at the Government General Office Calcutta.*

MORAINS IN MAZIERH RAVINE, NAGA HILLS.

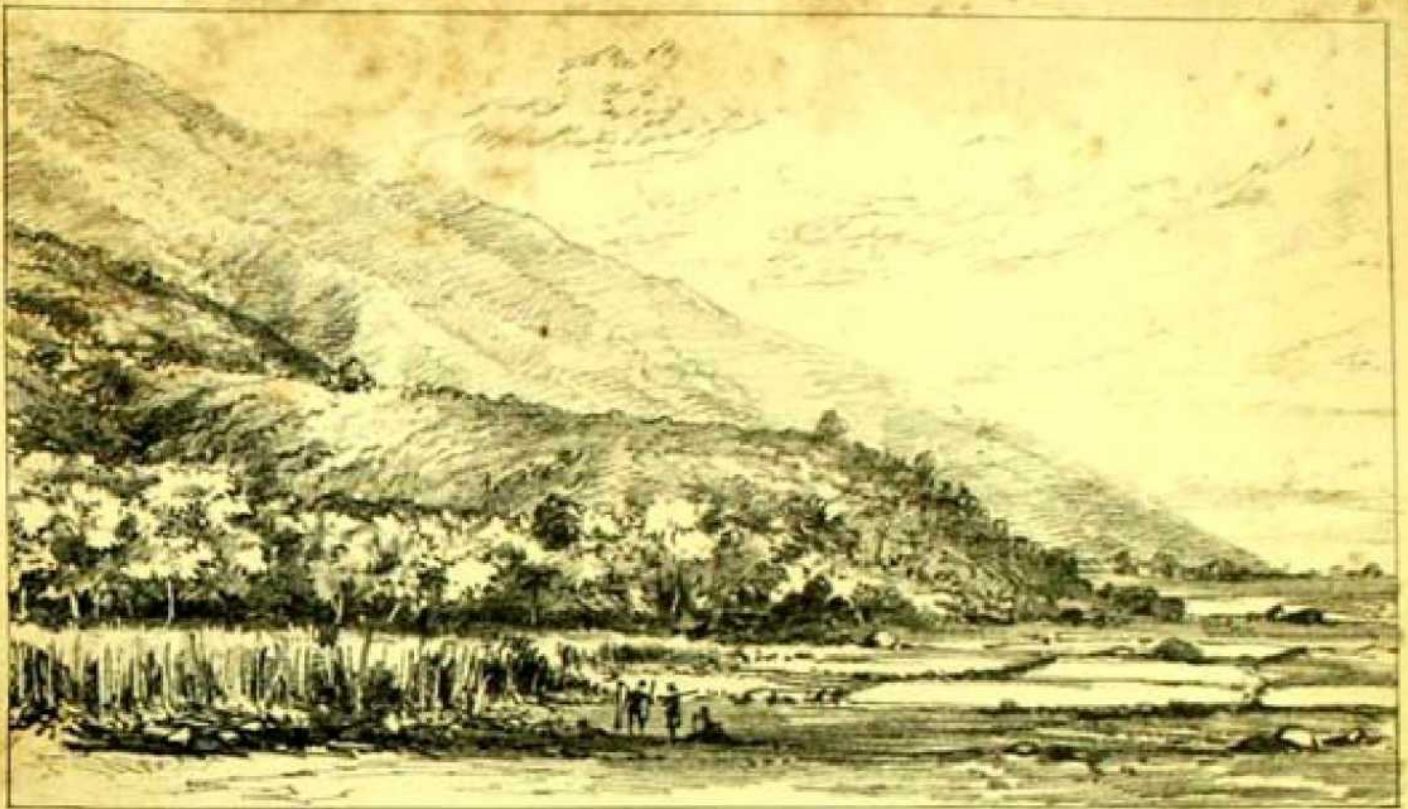




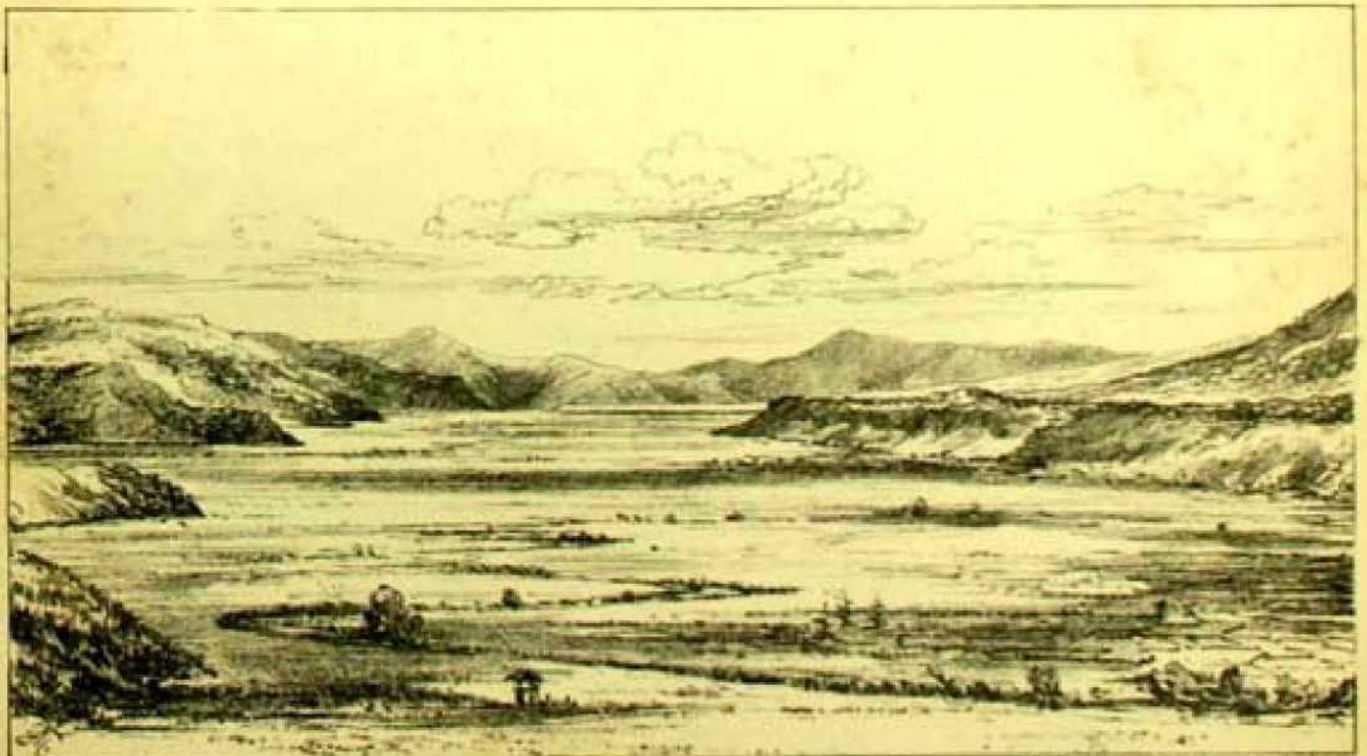
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ALLUVIAL TERRACES---HEAD OF BARAK VALLEY.





(Fig 1) LATERAL MORaine MAZIERH RAVINE, NAGA HILLS.

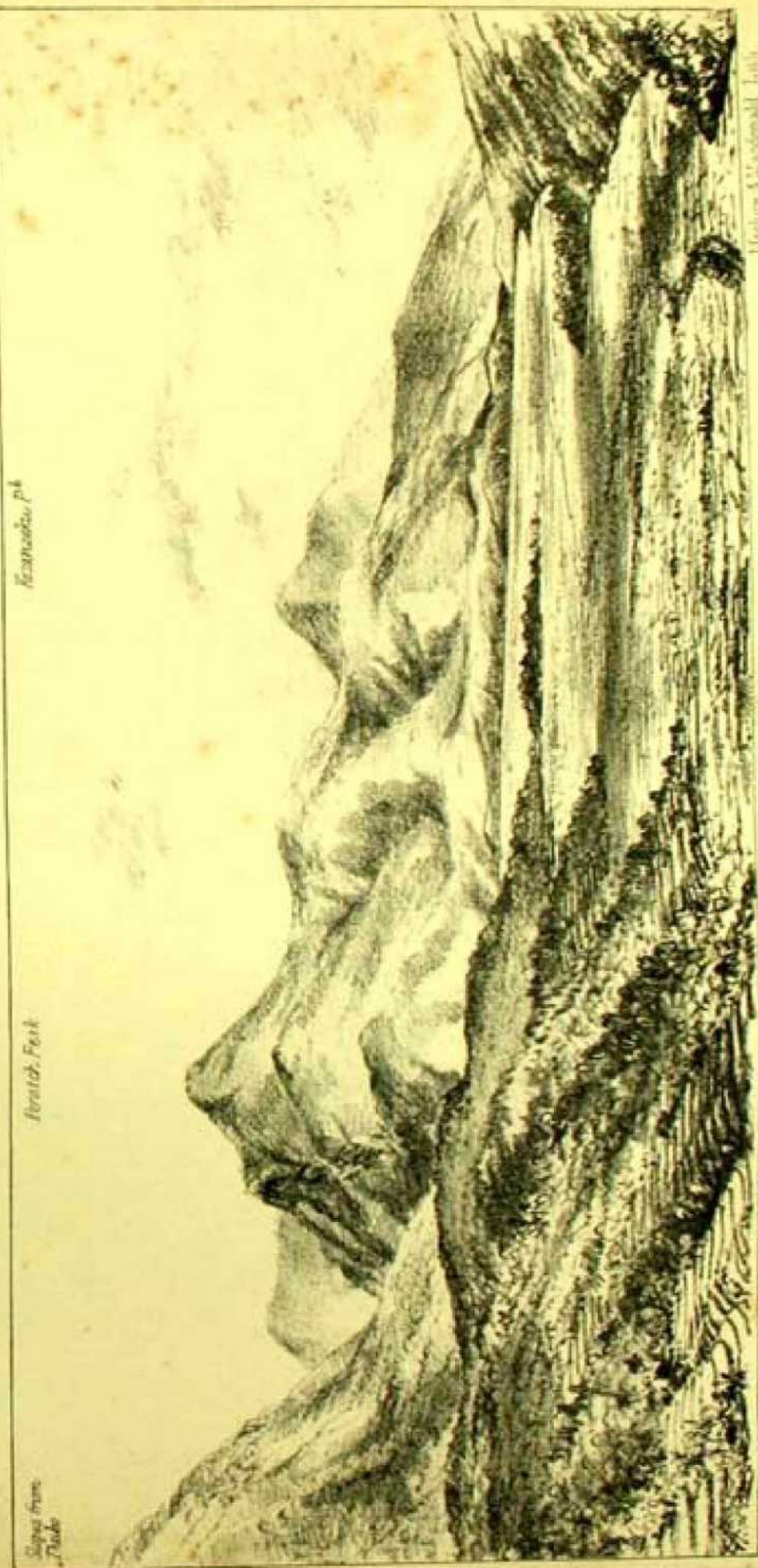


Godwin Austen Del.

Machure & Macdonald Lith.

(Fig 2) LOOKING DOWN THE KHONGBA VALLEY. MUNIPUR. (Old Lake Bed)

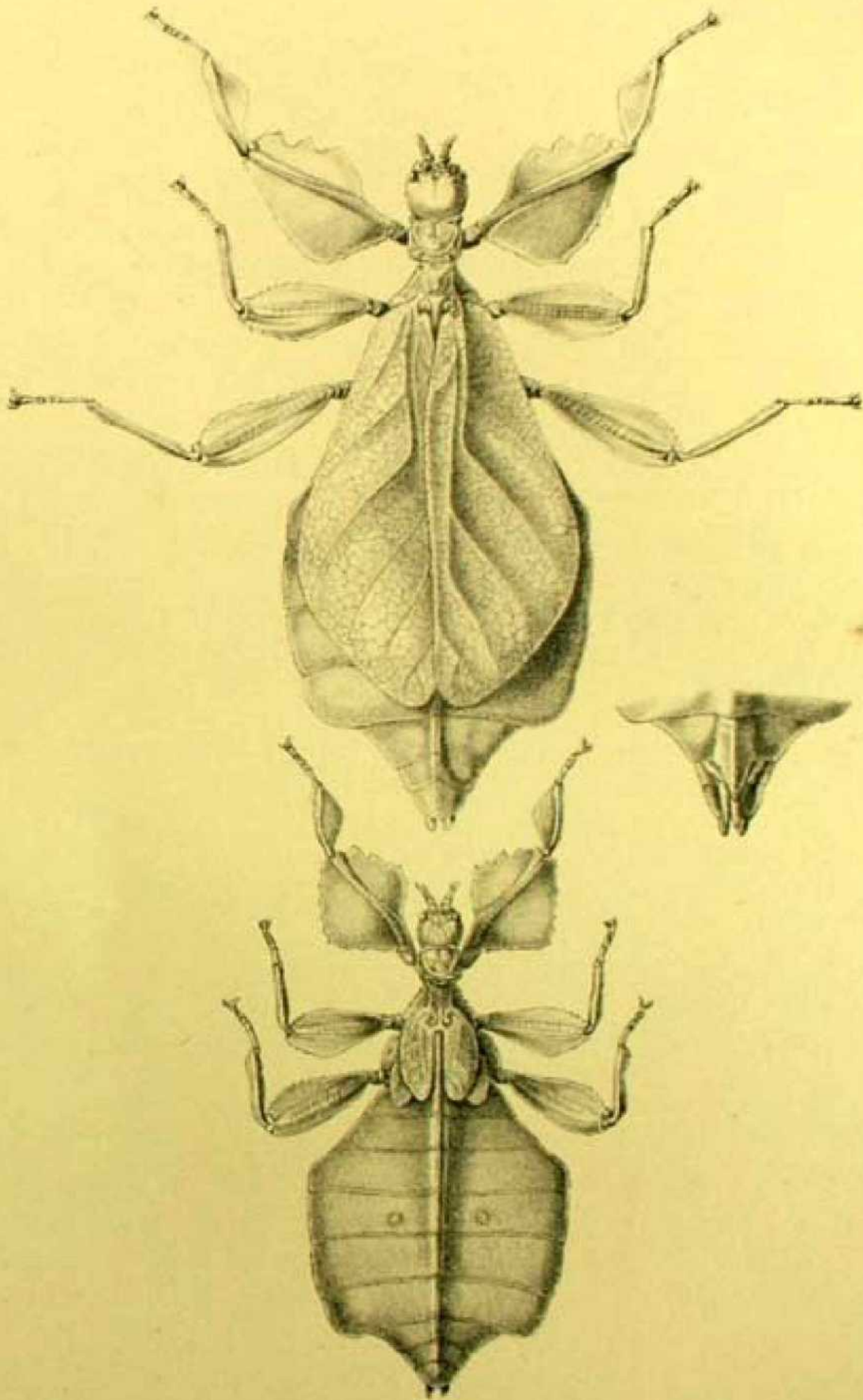




GAZIA RUHR MORAINES, near ZAKAMEH, NAGA HILLS

Edwin Austen del.

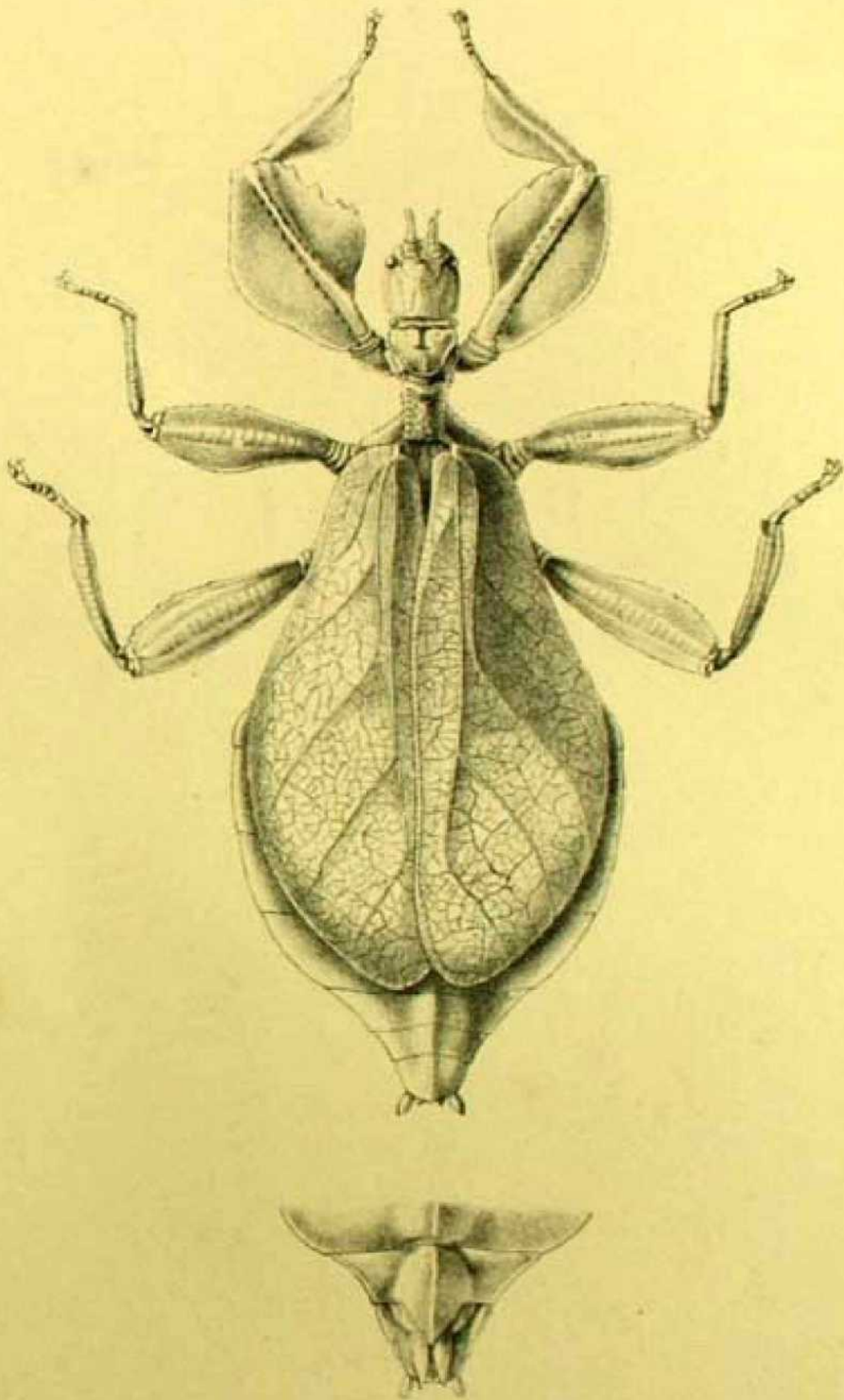




J. Schaumburg, Lith.

PHYLLIUM CELEBICUM. ♀





J. Schausburg, Lith.

PHYLLIUM WESTWOODII ?





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# JOURNAL OF THE ASIATIC SOCIETY.

—◆—  
Part II.—PHYSICAL SCIENCE.

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No. III.—1873.
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XIII.—*On the species of Marmot inhabiting the Himalaya, Tibet, and the adjoining regions.*—By W. T. BLANFORD, F. R. S., F. Z. S.

(Received July 30th, 1875 ;—Read August 4th, 1875.)

The distinctions and nomenclature of the Himalayan and Tibetan species of marmot appear to me in need of careful revision. The necessity for investigating the subject during an endeavour to ascertain the name of the Ladák species, and of a new form of which specimens were obtained by Dr. Stoliczka at the Kaskasu pass, on the road from Yárkand to the Pámir plateau, has convinced me that the received synonymy of the two best known species requires reconsideration, and that several of the identifications made by Gray, Blyth, Jerdon, and Anderson are erroneous.

The history of the nomenclature of Himalayan and Tibetan marmots appears to be the following. In 1841,\* Mr. Hodgson described a species from the "Kachar" of Nepal and the plains of Tibet under the name of *A. Himalayanus*. In 1843, he redescribed this species and suggested altering the name to *Tibetensis*, and at the same time distinguished a smaller form with a longer tail and somewhat different colouring as *A. Hemachalanus*. From references made at various times to his unpublished catalogue it is probable that *A. Hemachalanus* had originally been called *A. Tibetanus* by Mr. Hodgson, and it appears under that name in the British Museum Catalogue of Mr. Hodgson's collections. In the same year, 1843, Dr. Gray, in the British Museum 'List of specimens of Mammalia', united *A. Himalayanus*,†

\* For references see below.

† Under *A. Himalayanus* in this catalogue, after the reference to Hodgson's description, there is added "Griffith, Jour. A. S. B. 1841, 779 f" The proper reference is



and "*A. fulvus*, Eversman" to *A. bobac* of Schreber. There is no evidence that these species had ever been compared, and the only specimen stated to exist in the British Museum at the time was said to be from Siberia.

The next addition to the nomenclature was by Jacquemont, who described a marmot from the range north of the Kashmir valley as *A. caudatus*. His description was published, with a figure of the animal, in the appendix by Geoffroy St. Hilaire to Jacquemont's posthumous work, the '*Voyage dans l'Inde*,' in 1844.

In the '*Catalogue of the specimens and drawings of the Mammalia and Birds of Nepal and Thibet presented by B. H. Hodgson, Esq. to the British Museum*,' the larger or short-tailed marmot is called *A. bobac*, Gmelin, and the smaller *A. Tibetanus*, Hodgson. The same names are preserved in the second edition of the catalogue issued in 1863.

In 1847 the "large Himalayan marmot" was described by Dr. Jameson as *Arctomys Tataricus*. This description appears to have been overlooked by Indian naturalists.

In 1851, Horsfield in his '*Catalogue of the Mammalia in the Museum of the Hon. East India Company*' classed both *A. Himalayanus* and *A. caudatus* as synonyms of *A. bobac*.

Omitting several notices of the various Himalayan marmots by travellers, the next noteworthy attempt at discriminating the species was by Adams in 1858. He called the "red marmot" of Kashmir *A. bobac*, and the "white marmot" *A. Tibetanus*. It is evident, I think, that most writers apply the name *A. bobac* to Adams's "white marmot."

Blyth in his catalogue (1863) united all the Himalayan marmots under *A. bobac*, Schreber, giving as synonyms *Mus arctomys*, Pallas (which is the original name of *A. bobac*), *A. fulvus*, Eversman, *A. Tibetanus*, *Himalayanus* and *Hemachalanus*, Hodgson (the last with a note of interrogation, however), and *A. caudatus*, Jacquemont. In a foot note Blyth points out the distinctions between Hodgson's two supposed species, but adds that he cannot satisfactorily discriminate two species in the Society's skins and skulls. Dr. Stoliczka\* in 1865 was also disposed to unite the two forms found in the western Himalayas, but he gave no details.

Jerdon, in his '*Mammals of India*,' considered that Hodgson was correct in separating *A. Hemachalanus* from the short-tailed form and, consequently,

probably J. A. S. B., X, 1841, p. 978, where mention is made by Dr. Griffith of a marmot, the size of a beaver, found at between 11,000 and 12,000 feet in Afghanistan, at the Hageeguk, Kaloo, and Erak passes. Of this animal no specimens appear ever to have been described, but, as I shall subsequently shew, there is a skull, probably from Afghanistan, in the Society's old collection.

\* J. A. S. B. XXXIV, p. 111, note.



distinguished two species; *A. bobac* (with *A. Tibetanus* and *Himalayanus* of Hodgson and *A. caudatus* of Jacquemont as synonyms) and *A. Hemachalanus*. Fitzinger in his 'Versuch einer natürlichen Anordnung der Nagerthiere' enumerates two Himalayan and Tibetan species of *Arctomys*, which he calls *A. Tataricus*, James. (with, as synonyms, *A. Himalayanus*, Hodgs. *A. bobac*, Gray, and *A. caudatus*, Gieb.) and *A. caudatus*, Isid. Geoffr.

In Dr. Falconer's posthumous 'Palæontological Memoirs' there is an excellent description of the common marmot of Western Tibet with a full account of the animal's habits. He calls the species *A. Tibetana*, and in a note by the editor it is apparently identified with *A. Himalayanus*, an identification which, as I shall shew hereafter, is incorrect.

Dr. Anderson in 1871\* distinguished two species of marmot from Ladák and the Kuenlun mountains, one of which he identified as *A. bobac* (with *Mus arctomys*, Pallas, *Arctomys fulvus*, Evers., *A. Himalayanus* and *A. Tibetanus*, Hodgs. *A. caudatus*, Jacquemont, *A. bobac*, Gray, Horsfield, Blyth, and Stoliczka, and *A. Tibetanus*, Adams as synonyms), the other with *A. Hemachalanus* (synonyms—*A. bobac* of Adams and partly of Blyth and Stoliczka).

In 1870, MM. Milne-Edwards described *Arctomys robustus* from Mo<sup>u</sup>-pin in Eastern Tibet. And I may conclude these notices by a reference to M. Severtzoff's work 'Turkestanskije Jevotnie,' in which *A. baibacinus*, Brandt and *A. caudatus*, Geof. are said to be found in Western Turkestan. Unfortunately the work in question is entirely in Russian and several of the identifications are incorrect, so that it is impossible to feel any certainty as to the animal which Severtzoff has identified with *A. caudatus*. I think it improbable that the Kashmir marmot is really found in Russian Turkestan. It is more probable that the species is the *A. aureus* described on a previous page† from the specimens obtained by the late Dr. Stoliczka at the Kaskasu pass between Yárkand and the Pámir.

I may here state at once that I have reason to believe that, besides *A. robustus*, there are not two, but three species of Himalayan or Tibetan marmots, and that a great part of the confusion in the nomenclature is due to this circumstance.

In the synonymy above quoted one name frequently occurs, which appears to me to have been admitted by mistake. This is *Arctomys fulvus*, Eversman. Blyth gives no reference; Gray, in the British Museum Cat. p. 148, gives Griffith, A. K. t. 118, and, as Anderson gives precisely the same,

\* The title of Dr. Anderson's paper in the Proceedings of the Zoological Society 'On some rodents from Yárkand' is unfortunate, for only two of the four species described had been obtained in Turkestan territory and not one was from the neighbourhood of Yárkand, whilst all four are found in Ladák.

† Ante, p. 109 of this volume.



I suppose there may be such a name in some editions of Griffith's Animal Kingdom, though I cannot find it in the copy in the Society's library. In any case, I have no doubt the species is really *A. fulvus* of Lichtenstein, described in Eversman's 'Reise nach Buchara,' p. 119. That species is a *Spermophilus* and not a true *Arctomys*,\* and, consequently, is distinct from all the Himalayan species, none of which, so far as is known, have cheek pouches.

The next point for consideration is what is *Arctomys caudatus* of Jacquemont. As it is described as having a tail two-thirds the length of the body, it is evidently not *A. bobac*,† to which it is referred by Blyth, Jerdon, and Anderson. It is clearly, on the other hand, the same as the species referred by Anderson to *A. Hemachalanus*. Anderson's specimen agrees pretty fairly with Jacquemont's figure and description; there is more black on the back and tail in the former, and the abdomen wants the ferruginous tint, but neither of these characters is constant. The localities whence the two were procured are close together; the marmot skin obtained by Dr. Henderson and described by Dr. Anderson being from Matayon, just north (on the Dras side) of the Zogi-la‡, between Srinagar and Leh; whilst Jacquemont's type was shot at a place which he called Gombour or Gombur, close to the head of the Sind valley, but on the Indus side of the watershed and in the valley of a stream running into the Dras river.

There is a possibility of a second and smaller marmot being found in the Kashmir ranges, for Vigne, Travels in Kashmir &c., II. p. 230, mentions seeing one, as large as a small fox, on the road from Srinagar to Skardo. The animal which I identify with *A. caudatus* is the size of a very large fox.

A skin just received at the Indian Museum from Dr. Aitcheson at Srinagar agrees with that described as *A. Hemachalanus* by Dr. Anderson, except that the back is blacker. Mr. Lydekker informs me that these skins are precisely like those of all the marmots he saw on the ranges north of Kashmir.

Still, however, I am in no way prepared to admit that Dr. Anderson was correct in identifying the Ladak marmot with Mr. Hodgson's *A. Hemachalanus*. The former is a large marmot, one of the largest known species, the skull measuring 105 mm. (4. 12 inches) or as much as *A. robustus*. Hodgson's *A. Hemachalanus* on the contrary must be a small marmot, the body being only 12 to 13 inches long, and the tail  $5\frac{1}{2}$  to  $5\frac{1}{2}$ , the corresponding dimensions (taken from skins) of the Ladak marmot being 22 and

\* Brandt, Bull. Ac. Imp. Sc., 1844, II, p. 366.

† This has been noticed by MM. Milne-Edwards, Rech. Mam, I, p. 312.

‡ This name has been converted into Tooglen pass in the P. Z. S. 1871, p. 562.



10½ inches.\* Dr. Anderson concludes that Mr. Hodgson had never seen an adult of *A. Hemachalanus* and that he drew up his description from immature specimens. I do not think this view is probable. Hodgson was careless in matters of nomenclature, as many naturalists were in his time, but he collected largely and studied the animals he described carefully, as is shewn by the minuteness of his descriptions. I scarcely think, had the specimens he described been half grown, that he would have overlooked the evident immaturity of the skulls, which he must have extracted, for he describes the teeth. Moreover, I think Dr. Anderson must have overlooked Mr. Hodgson's remark that he had kept some of the smaller marmots alive for months, one of them for over a year and a quarter. Surely he would have noted their growth during that period. I cannot say how long a marmot may be in attaining its full growth, but if it requires more than a year, it differs greatly in this respect from most rodents.

There are also, I think, some important differences between the colouration of Hodgson's *A. Hemachalanus* and the Kashmir marmot. The former is described as having the general colour "dark grey with a rufescent tinge which is rusty and almost ochreous red on the sides of the head, ears and limbs, especially in summer. Bridge of nose and last inch of tail dusky brown." In the latter the general colour is more yellow, the whole lower parts and the limbs are ferruginous (there appears to be much variation, perhaps sexual, in the colour of the upper parts), the bridge of the nose is not dark, but the tip is, and at least 3 inches at the end of the tail are black.

It is true that Dr. Anderson mentions his having obtained skins purchased at Darjiling which were undistinguishable from the Ladák marmot.† It is probable that these skins had been brought from upper Sikkim, or Tibet, but if so, and if they are correctly identified, the only conclusion I can come to is that these must be three species of marmots in the Himalayas of Sikkim and Nepal.

*A. Tataricus* I am unable satisfactorily to identify. The reference in Wiegmann's 'Archiv'‡ runs thus "A supplementary description of the large Indian Marmot has appeared by Dr. Jameson, who has applied to it the name of *Arctomys Tataricus* (Inst. p. 384)." The work referred to is

\* The length of the tail in the Ladák specimen is without the hair at the end. In Mr. Hodgson's measurement the hair is, I think, included, although its inclusion is not specified, because it is comprised in the corresponding measurement of the tail of *A. Himalayanus* on the same page.

† Mr. Wood-Mason has had search made for these skins, but owing to so many of the Museum specimens having been packed away pending their transfer to the new building, it has not been possible to find them.

‡ 1848, Pt. 2, p. 155.





probably a French one, L' Institut, at least so I infer from the fact of a paper by Gervais quoted with a similar reference in the 'Archiv' being assigned to this magazine in Carus and Engelmann's 'Bibliographia Zoologica'. At the same time neither Jameson's nor Gervais' paper is quoted in the Royal Society's Catalogue, although L' Institut is included in the works catalogued.

There is a short paper by Dr. Jameson on the Zoology of Chinese Tartary in the Calcutta Journal of Natural History,\* in which he briefly mentions a marmot which he observed beyond the Niti pass, and of which he says that it is of a reddish yellow colour and the size of a rabbit. I know of no Himalayan marmot which when adult is so small as a rabbit; the smallest species is *A. Hemachalanus*, and possibly this may have been the animal observed by Jameson, but in Weigmann's 'Archiv' he is said to have described the *large* Indian marmot: of course it does not follow that the species seen by him north of the Niti Pass was the same which he subsequently named *A. Tataricus*. Meantime the identification is of less moment, because in all probability the species named by Jameson was either *A. Himalayanus*, *A. Hemachalanus*, or *A. caudatus*, all of which names have priority over *A. Tataricus*.

But the most important point of all is the identification of the short-tailed Himalayan marmot with *A. bobac*. This apparently was made by Gray without his having examined specimens of *A. Himalayanus*; and Blyth, Jerdon, and Anderson, so far as I know, had never seen examples of the true *A. bobac*, so that I doubt if the species have ever been compared. Pallas (Zoog. Ros. As. I, p. 155) united all the known† Asiatic marmots without cheek pouches to the *Bobac*, which he called *Arctomys Baibàk*, but he described the Kamschatkan race as a well marked variety. Brandt (Bull. Ac. St. Pet. 1844, II, p. 364) separated this Kamschatkan form as a distinct species, which he called *A. Camschatica*, but which he suggested might be identical with the American *A. monax*, and he indicated another species from the Altai under the name of *A. baibacina*, which, however, he did not describe.‡ Severtzoff quotes this species *A. baibacinus* from western Turkestan. Without attaching much importance to this circumstance for the reasons already mentioned, I think it yet remains to be shewn that the true *A. bobac* of Schreber, *Mus arctomys* of Pallas, is found in Central Asia at all. The name was originally applied to the marmot of Poland and

\* Vol. VII, p. 360.

† Of course no Himalayan marmots had been described in 1811 when Pallas's work was first published.

‡ He appears to have described it subsequently in a paper on the vertebrata of Siberia, which I cannot find. It is mentioned by Milne-Edwards in Rech. Mam. p. 311, note.



Galicia, which appears to be a much smaller animal, weighing 8 to 10lbs., the body being 16 inches, the tail 4 inches 4 lines, or including the hair 5' 4" long, whereas in *A. Himalayanus* the head and body measure 22 to 24 inches, and the tail 6½ with the hair according to Jerdon, 5½ to 6½ according to Hodgson. Pallas's original measurements of *A. bobac*, which I quote above,\* are probably in French inches, which would render the difference rather less, but still it is very considerable.

Pallas's original description of the colour of *A. bobac* runs thus: *Color rostro et circa oculos magis minusve fusco-nigricans, inter mystaces sub-ferrugineus; parotides pallidæ, gula ferruginea, reliquum corpus infra et artus interiore latere ferrugineo-lutescentia; supra gryseus, pilis longioribus nigris, vel fuscis apice gryseo-pallidis magis minusve inumbratus. Cauda basi subtus ferruginea, majore parte lutescens, a medio picea, apice atra.* The animal referred to *A. Himalayanus* does not differ greatly in colour from Pallas's description. MM. Milne-Edwards,† however, point out that *A. bobac* is a very much paler animal than *A. robustus*, which appears closely to resemble *A. Himalayanus*, and may perhaps be the same.

On the whole I think it is far safer for the present to keep *A. Himalayanus* distinct from *A. bobac*. I have not sufficient materials at present to determine whether the short-tailed marmot of the Kuenlue and Ladák is absolutely identical with the type of *A. Himalayanus*, but it appears to correspond fairly and I know of no distinction.

The figure of *A. robustus* in the 'Recherches sur les Mammifères' is much more richly coloured than *A. Himalayanus* is, but the authors of the work point out that the plate is over-coloured. The species are evidently very closely allied and may possibly be identical. The skulls are very similar, the nasals being a little shorter in *A. robustus*, and the point of bifurcation of the sagittal crest further back, but there is a possibility that these differences may be due to age, and it is evident from the state of the teeth that the figured skull of *A. robustus*, although apparently full grown, is younger than that of *A. Himalayanus* which I have compared with it: this skull of *A. Himalayanus* is from one of the skins brought by Dr. Henderson from the Sanju Pass, Kuenlue range. There are, however, some little differences in the form of the zygomatic arch, &c., and especially in the relation of the longitudinal to the transverse diameter, which make me hesitate to consider the two the same.

In trying to throw some light upon this question of the Himalayan marmots, I have examined the following specimens.

I. Four skins with skulls of *A. aureus* from the Kaskasu Pass.

\* Glires, p. 113.

† Recherches Mam. p. 311.





II. Three skins of *A. Himalayanus* (the same as examined and described by Anderson) from Kitchik Yilak, close to the Sanju Pass in the Kuenluen range, south of Yarkand ('Lahore to Yarkand,' p. 101).

III. A skin of *A. caudatus* (the same as described by Anderson as *A. Hemachalanus*) from Matayon on the Zogi-la near Drás between Kashmir and Ladák, and a flat skin of the same probably from Kashmir; also a skull of the same brought by Mr. Lydekker from the range north of Kashmir.

IV. The specimens made over by the Asiatic Society to the Indian Museum, three stuffed skins, a skeleton, and two skulls, all enumerated in Blyth's Catalogue\*. These require a few words of notice. By both Blyth and Anderson the whole have been referred to *A. bobac* (i. e. *A. Himalayanus*). Two stuffed specimens (one of them young and both with imperfect tails) which were presented by Mr. Hodgson, probably belong to this species. The other specimens are a stuffed skin and the skeleton from an animal brought alive to Calcutta from Sikkim, and two skulls, one presented by Lieut. Brownlow, who probably procured it in the western Himalayas, and the other from the Burnes collection, and, therefore, it may be expected, from Afghanistan. I have carefully examined the three skulls and am convinced that they belong, in all probability, to three different species, that of the skeleton differing widely from both the others in the form of the palate and of the nasal bones, in the length of the sagittal crest and the point of its bifurcation, whilst of the two remaining one is much larger than the other, besides other differences. The skeleton is evidently that of a fully adult animal. It measures from snout to insertion of tail 15 inches along the curve of the back, the tail vertebræ  $4\frac{1}{2}$ . This is very close to the measurement of *A. Hemachalanus*, and the skin agrees with the description of that species in having the frontal portion of the face dark brown. The fur is short and thin, but it is scarcely probable that the fur of a marmot which had lived for months in Calcutta would retain its original character. I think it highly probable that this specimen really belongs to *A. Hemachalanus*. It certainly does not agree with *A. Himalayanus*.†

The skull presented by Lieut. Brownlow is, I find by comparison, that of *A. caudatus*. The Burnes' collection skull, although somewhat resembling that of the new species *A. aureus*, appears to me to belong to a

\* Cat. Mam. Mus. As. Soc., p. 108.

† I should add, that in these specimens, as in all other skins either of birds or mammals, which have been exposed to the light for many years in Calcutta, the colours have faded greatly, and in all the mammals the texture of the fur appears to have changed, becoming much harsher. I think it much to be regretted that small mammals should be mounted at all; as a rule valuable skins and types should be kept unmounted in drawers, and not exposed.



different and probably undescribed species, which should be looked for in Afghanistan. It is very possibly the form mentioned by Dr. Griffith as seen by him at the Hageeguk, Kaloo, and Erak passes,\* and also briefly referred to in Sir Alexander Burnes' 'Cabool.'†

It is useless to refer to the various notes by travellers, on the marmots\* observed by them, in the hope of ascertaining the distribution of the different species, since the external differences are, as a rule, not sufficient to render the brief descriptions given characteristic of any particular kind, and the task of determining the exact range of each species must be left to future research. I shall conclude this paper by giving the names and the synonymy, so far as I have been able to unravel it, of the four species, the existence of which in the Himalayas and the neighbouring ranges to the north-west I consider probable, merely adding that in all probability another species, hitherto undescribed, inhabits Afghanistan. I am quite at a loss to conceive what is the form with large ears represented in Hooker's 'Himalayan Journals,'‡ and which is said to migrate sometimes in swarms from Tibet to Upper Sikkim. Certainly, no known Himalayan marmot approaches this animal in the structure of the ears§.

Section 1.—*Short-tailed marmots having the tail less than one third the length of the head and body.*\*

# 1. ARCTOMYS HIMALAYANUS.

*A. Himalayanus*, Hodgson, J. A. S. B., 1841, X, p. 777.

"*A. Himalayanus* of Catalogue, potius *Tibetensis* hodie," Hodgson, J. A. S. B., 1843, XII, p. 409.

"*A. bobac*, Schreb." *partim*, Gray, List of the specimens of Mammalia in the collection of the British Museum, 1843, p. 148, *nee* Schreber.

"*A. bobac*, Gmelin", Gray, Cat. spec. &c. Mammalia and Birds of Nepal and Thibet presented by B. H. Hodgson, Esq. to the British Museum, p. 23, (1846); *nee* Gmelin.—Ib. 2nd Edition, p. 12, (1863).

? *A. Tataricus*, Jameson, L'Institut. 1847, XV, p. 384.

"*A. bobac*, Schreb." Horsf. Catalogue of Mammalia in the India House Museum, p. 164, (1851); *nee* Schreber.

"*A. Tibetanus*, Hodgson." white marmot of Europeans, Adams, P. Z. S. 1858, p. 521.

"*A. bobac*, Schreb." *partim* Blyth, Cat. Mam. Mus. As. Soc., p. 108, (1863); *nee* Schreber.

"*A. bobac*, Schreb." Jerdon, Mammals of India, p. 18, (1867), *nee* Schreber.

"*A. Tataricus*, Jameson," Fitzinger, Sitzungs. b. k. Ak. Wiss. Wien, 1867, LV, 1, p. 491.

\* See note on page 114.

† p. 163.

‡ Vol. II, pp. 109, 170, smaller edition.

§ I cannot help feeling some doubt as to whether the animal figured is a marmot at all.





*A. robustus*, H. and A. Milne-Edwards, *Nouv. Arch. du Musée*, VII, Bull. p. 92 (1870).—*Recherches sur les Mammifères*, I, p. 309, Pl. XLVII, XLIX.

"*A. bobac*, Schreb." Anderson, *P. Z. S.*, 1871, p. 560, *nec* Schreber.

General colouration greyish fulvous, beneath yellow, hair of the back with very short black tips, tail dark brown at the end. Length 22 to 24 inches, tail with hair at the end  $5\frac{1}{2}$  to  $6\frac{1}{4}$ .

*Hab.*—Tibet : Ladák : Kuenluen south of Yárkand.

Section 2.—*Marmots with tails one third or more than one third the length of the head and body.*

## 2. ARCTOMYS HEMACHALANUS.

*A. Hemachalanus*, Hodgs., *J. A. S. B.* 1843, XII, p. 410.

"*A. Tibetanus*, Hodgs.," Gray, *Cat. Mam. Birds Nipal*, p. 24, (1846)—2nd Edition p. 12, (1863).

"*A. bobac*, Schreber" *partim*, Blyth, *Cat. Mam. Mus. As. Soc.* p. 108, (1863), *nec* Schreber.

"*A. hemachalanus*, Hodgson," Jerdon, *Mam. Ind.* p. 182, (1867).

"Colour dark grey with a full rufous tinge, which is rusty and almost ochreous red on the sides of the heads, ears and limbs, especially in summer. Bridge of nose and last inch of tail dusky brown. Length 12 to 13 inches tail (with hair)  $5\frac{1}{4}$  to  $5\frac{1}{2}$ ".\*

*Hab.*—Sikkim and Nepal, in the higher regions of the Himalayas.

## 3. ARCTOMYS CAUDATUS.

*A. caudatus*, Jacquemont, *Voyage dans l'Inde*, Vol. IV, *Zoologie*, p. 66, *Atlas*, Vol. II, Pl. 5, (1844).

"*A. bobac*, Schreber," red marmot of Europeans, Adams, *P. Z. S.*, 1858, p. 521, *nec* Schreber.

"*A. bobac*, Schreber," *partim* Blyth, *Cat. Mam. Mus. As. Soc.* p. 108, (1863), *nec* Schreber.

"*A. bobac*, Schreber," *partim*, Jerdon, *Mam. Ind.* p. 182, (1867), *nec* Schreber.

"*A. caudatus*, Isid. Geoff.," Fitzinger, *Sitzungb. k. Ak. Wiss. Wien*, 1867, LV, 1, p. 491.

*A. tibetana*, Falconer, *Palæontological Memoirs*, I, p. 583, *nec A. Tibetanus*, Hodgs.

"*A. hemachalanus*, Hodgson", Anderson, *P. Z. S.* 1871, p. 561, *nec* Hodgson.

Colour rich rufous yellow when adult, more or less black on the back : sometimes the back is black throughout : lower parts with a strong ferruginous tinge ; tail black for the greater portion of its length. Head and body about 25 in., tail with hair 13, or more than half the length of the body.

*Hab.*—Mountains north of Kashmir : Ladák.

\* These are Hodgson's measurements, but I anticipate that the animal grows to a larger size, to judge by the skull, which is as large as that of *A. aureus*.



#### 4. ARCTOMYS AUREUS.

*A. aureus*, W. Blanford, ante, p. 106.

On a previous page I described this species very briefly. The following is a fuller account, taken from four specimens, three brought by Dr. Stoliczka and one by Captain Biddulph from the mountains west of Yarkand.

General colour tawny to rich brownish yellow, the dorsal portion conspicuously tinged with black from all the hairs having black tips, but these are far more conspicuous in some specimens than in others; face grey to blackish with a rufous tinge, covered with black and whitish hairs mixed, which are about half an inch long on the forehead, the black hairs more prevalent in some specimens, apparently males, than in others; the middle of the forehead sometimes more fulvous. Just on the nose is a blackish brown patch, and there is a narrow band of short black hairs mixed with white around the lips: sides of the nose paler; whiskers black. Hairs of the back  $1\frac{1}{4}$  to  $1\frac{1}{2}$  inches long, dark slaty at the extreme base for about  $\frac{1}{2}$  inch, then yellow, becoming deeper golden yellow towards the extremity, the ends black. In the blackest specimens (? males) the posterior portion of the back wants the black tips. Tail the same colour as the back, except the tip, which is black; the length of the black tip varies, but never exceeds about  $2\frac{1}{2}$  inches in the specimens before me, and in three out of the four it is only about an inch: hairs of the tail about 2 inches long, brown at the base. Lower parts rather browner, the hairs shorter and thinner, chocolate brown at the base, without the short woolly under-fur, which is very thick on the back. Feet above yellowish tawny like the sides.

Length taken on the dried skins:

|                                                        |               |
|--------------------------------------------------------|---------------|
| Nose to insertion of tail, .....                       | 16.5 to 18.75 |
| Tail, without hairs at the end, .....                  | 5 to 6.5      |
| Hairs at end of tail, .....                            | 1.5 to 1.75   |
| Fore-foot (palma) to end of toe, without claws, .....  | 2.05          |
| Mid toe, without claw, measured below, .....           | 0.8           |
| Claw, measured above, .....                            | 0.6           |
| Hind foot (planta) to end of toe, without claws, ..... | 2.9           |
| Mid toe, without claw, .....                           | 0.8           |
| Claw of do., measured above, .....                     | 0.52          |

This is a very much smaller animal than *A. caudatus*, and its tail appears shorter in proportion and with less black. The colour of the lower parts is less rufous and the feet are tawny yellow, not ferruginous as in the larger form. The fur of *A. aureus* too is softer. From *A. Himalayanus* the present species is distinguished by its much longer fur, by being much yellower in tint and less grey, and by its longer tail. It is also much smaller. From *A. Hemachalanus* it may be recognised by its longer tail and richer colouration.



The following are the dimensions of skulls of all the above species in parts of a metre, those of *A. robustus* having been taken from the figures. I also add the measurements of the skull of a specimen of *A. bobac* belonging to the Berlin Museum.

|                                                                       | <i>A. Himalayanus.</i><br>(Kuenlun). | <i>A. Himalayanus.</i><br>(North of Sikkim). | <i>A. robustus.</i> | <i>A. Hemachalanus.</i> | <i>A. caudatus.</i> | <i>A. aureus.</i> | <i>A. bobac.</i> |
|-----------------------------------------------------------------------|--------------------------------------|----------------------------------------------|---------------------|-------------------------|---------------------|-------------------|------------------|
| Length from occipital plane to anterior end of nasal bones, . . . . . | ·105                                 | ·101                                         | ·104                | ·093                    | ·105                | ·094              | ·0885            |
| Breadth across widest part of zygomatic arches, . . . . .             | ·0655                                | ·0675                                        | ·065                | ·061                    | ·066                | ·057              | ·059             |
| Do. behind postorbital processes, . . . . .                           | ·019                                 | ·019                                         | ·019                | ·020                    | ·016                | ·017              | ·0165            |
| Length of nasal bones, . . . . .                                      | ·045                                 | ·040                                         | —                   | ·038                    | ·042                | ·038              | ·038             |
| Breadth do. behind, . . . . .                                         | ·010                                 | ·013                                         | ·011                | ·011                    | ·017                | ·0105             | ·0105            |
| Do. do. in front, . . . . .                                           | ·018                                 | ·018                                         | ·015                | ·016                    | ·020                | ·0165             | ·0155            |
| Length of row of upper molars, . . . . .                              | ·025                                 | —                                            | ·025                | ·024                    | ·0235               | ·020              | ·0215            |
| Do. lower jaw from angle to alveolar margin, . . . . .                | ·069                                 | ·070                                         | ·069                | ·064                    | ·074                | ·066              | ·0625            |
| Height of do. at coronoid process, . . . . .                          | ·0425                                | ·039                                         | ·037                | ·036                    | ·041                | ·035              | ·036             |

P. S.—Oct. 28th. Some months have elapsed since the above paper was written, and in the meantime, through the kindness of several friends, I have been enabled to add materially to the evidence as to the distinctions of the different species of marmots.

In the first place, I am indebted to Professor Peters of Berlin, who, with great kindness and liberality, has sent a skin and skull of *Arctomys bobac* belonging to the Berlin Museum for examination. In its external characters this animal differs widely from *A. Himalayanus*. It is a sandy-grey animal with a brown wash, without a single black hair on its body, the hairs on the back being dusky at the base, then dirty white, and the tips of the longer hairs on the back and sides being brown. The lower parts throughout shew a ferruginous tinge. The terminal portion of the tail is brown. This skin measures from nose to rump 21 inches, tail  $5\frac{1}{2}$ ; but it is very much smaller than *A. Himalayanus*.

Of course this specimen may have faded and the tips of the hairs may have been black originally, as in Pallas's description, but there is nothing in the character of the skin to render this supposition probable, and if the tips of the hair had become paler, I should hardly have anticipated that they would have done so to precisely the same extent throughout the body. Moreover, the skin before me coincides closely with the figure in Schreber's Säugethiere, Pl. CCVIII, and with Messrs. Milne-Edwards' description.



Professor Peters tells me that the skin sent is from Siberia, and that he has endeavoured for years in vain to procure a Polish or Galician specimen.

Compared with the skins of *A. Himalayanus*, this specimen of *A. bobac*, besides being paler and having brown instead of black tips to the long dorsal hairs, has these hairs much longer and their dark tips more developed, and the fur generally is finer and softer. The skull, with a general similarity of outline, exhibits numerous differences, the most marked being the very much smaller proportional size of the molars in the upper jaw. The crown of the third molar is *A. Himalayanus* measures 6 mm. across, in *A. bobac* only 4.5 mm.

I am also indebted to Dr. Günther for having very obligingly re-examined the types of *Arctomys Hemachalanus* v. *Tibetanus* in the British Museum in order to ascertain if they were adults. He writes to me as follows :

"The skull of the type of *A. Tibetanus* is that of an adult animal, but this type is the most wretched specimen I have ever handled. It was an individual brought up in captivity ; size that of a very small rabbit, skin nearly hairless, claws abnormally long and as sharp as a needle, teeth carious, incisors malformed. The frontal bones are gone, but I suppose that they could not have been much arched, and the palate is very shallow, very slightly concave."

"There is another flat and imperfect skin of this *A. Tibetanus* from Hodgson's collection. It is somewhat larger than the former specimen, and is evidently adult, but there is no skull. Taking all the evidence before me, I believe that this species but slightly exceeded a rabbit in size. But then what differences in size you observe in our Swiss marmots."

The important point is, of course, to ascertain that Mr. Hodgson's original types were adult. The length of the tail shews that the species is distinct from *A. caudatus*, and the skulls differ very considerably. But some further evidence is forthcoming. Some time after the preceding paper was written the dead body of a marmot was sent to the Indian Museum by Mr. Rutledge. The animal is said to have been originally brought from Bhútán, but it has lived for a long time in captivity, and as usual the skin is in wretched condition and almost hairless. The dimensions, however, agree with those of *A. Hemachalanus*, and when the skull had been cleaned, it proved precisely similar to that of the old skeleton in the Museum, belonging to the animal said to have brought from Sikkim and to have lived for months in the Asiatic Society's compound. Mr. Fraser has also found, amongst the accumulated collections of the Museum, another skin and skull of a young individual, which also had been kept tame.

There is thus evidence of 5 individuals of this species at least, and I



have examined 3 skins and skulls myself. With the evidence before me, I have not the slightest doubt that a small marmot does inhabit the northern parts of Sikkim and Nepal, and that it is quite distinct in structure, colour, and size from the large *A. caudatus* of Kashmir and Ladak. Unfortunately, the Sikkim skins which Dr. Anderson identified with a specimen belonging to the Kashmir species have not been found. It is remarkable that every individual of *A. Hemachalanus* yet examined has been kept in captivity; skins of the wild animal are a great desideratum. The skull of the specimen received from Mr. Rutledge is perfectly well formed and all the teeth are healthy.

Dr. Aitcheson of Srinagar has had the kindness to make enquiries about the marmots of Kashmir, and he has sent me specimens of young *A. caudatus*. As in most young animals, the colours are indistinct, and there is a peculiar immature appearance about the fur. These young specimens can be at once distinguished from *A. Hemachalanus* by their longer tails.

It will be seen that the whole of the additional evidence tends to prove that, exclusive of *A. robustus*, there are three and not two species of marmot in the Himalayas and Tibet, and that neither of these species is identical with *A. bobac*.

Within the last few days, Mr. Mandelli of Darjiling has sent to the Indian Museum a magnificent collection of mammal skins from Sikkim and Tibet, part of which he has presented to the Museum, and he has most liberally allowed me to examine the whole. There is no specimen of *Arctomys Hemachalanus*, but there are two fine skins of *A. Himalayanus*. These coincide very fairly in external characters with those from the Kuenlue, they are a very little greyer in tint and darker on the face, but there can be no hesitation in referring both forms to the same species. The skull of one of Mr. Mandelli's skins has been extracted for me by Mr. Fraser. Although it is near to that of the Kuenlue marmot and to that of *A. robustus*, it differs somewhat from both; its longitudinal and transverse diameters being 101 and 67 millimeters, so that it is decidedly broader in proportion to its length, whilst its height is rather less, and the nasal bones are shorter and less convex. Despite these and other differences, there is a general agreement in details, and I feel disposed to believe that the distinctions are insufficient for separation. Moreover, it is evident that the cranial distinctions already pointed out in the case of *A. robustus* are not greater than those which are found between the two forms of *A. Himalayanus*, and, consequently, that either *A. robustus* must be united to that species, or the Kuenlue marmot must be classed as distinct. I prefer the former view and have adopted it in the preceding synonymy.

Dr. Severtzoff has recently visited London, and I am indebted to Mr. Dresser for obtaining from the Russian naturalist a few notes on some of the





1875.] *inhabiting the Himalaya, Tibet, and the adjoining regions.* 127

mammals described by him from Western Turkestan. I learn that the species identified as *Arctomys baibacinus* differs from *A. bobac* in being darker above, and more rufous below. It is a mountain species, whilst *A. bobac* inhabits the steppes. Dr. Severtzoff suggests that it may be identical with *A. robustus* (that is, doubtless, with *A. Himalayanus*). As *A. Himalayanus* extends from Eastern Tibet to the Kuenlun, keeping to great altitudes, above the range of almost every other mammal, it is by no means improbable that it may also occur farther to the north.

P. S.—*Nov. 8th.*—In the October number of the 'Annals and Magazine of Natural History' just received, Dr. Anderson has described another marmot from the mountains north of Kábul under the name of *A. dichrous*. From the description this appears to be distinct from *A. aureus* and the other species referred to above, and it is very probably the form indicated by Burnes and Griffith, a skull of which, as already mentioned, exists in the Society's old collection.

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XIV.—*Contributions towards a Knowledge of the Burmese Flora.*  
*Part II.—By S. KURZ.*

(Continued from Vol. XLIII, p. 141.)

*RUTACEÆ.*

*Conspectus of genera.*

A. Fruit separating into 2 to 5 distinct 2-valved carpels.

*Trib. I. ZANTHOXYLÆ.* Flowers usually polygamous. Disk free, or rarely wanting. Styles basilar or ventral, more or less free. Fruit-carpels coriaceous, the endocarp persistent or separating elastically.

× Leaves opposite or nearly so, rarely intermixed with nearly alternate ones. Unarmed.

EVODIA. Stamens 4-5. Leaves often compound, rarely 1-foliolate.

MELICOPÆ. Stamens 8. Leaves often 1- rarely 3-foliolate.

× × Leaves all alternate. Often armed.

ZANTHOXYLON. Petals 3—5, rarely none. Stamens as many. Leaves often pinnate.

B. Fruit a drupe or berry, rarely a capsule.

*Trib. II. TODDALIÆ.* Flowers usually polygamous. Disk free. Style single. Albumen usually present.

ACRONYCHIA. Petals 4. Stamens 8. Drupe or capsule 4-celled. Erect unarmed trees with 1—3-foliolate leaves.

TODDALIA. Petals 2—5. Stamens as many. Berry 4—7-celled. Climbers, often armed, with usually 3-foliolate leaves.

*Trib. III. AURANTIÆ.* Flowers hermaphrodite. Petals and stamens free or connate. Style simple. Ovules 1, 2 or more in each cell. Berry often pulpy, with a coriaceous or woody rind. Albumen none.

× Ovary-cells with 1 or 2 ovules only.

+ Style persistent, not jointed at the base.

GLYCOSMIS. Calyx 5-parted or -toothed. Stamens 10, free. Ovules solitary. Leaves pinnately 5-1—or rarely 7-foliolate.

+ + Style jointed at the base, deciduous.

† Leaves pinnate or 3-foliolate.

• Ovules 2 in each cell.

O Leaves pinnate or pinnately 3-foliolate.

‡ Cotyledons plano-convex, fleshy. Petals imbricate.

CHALCAS. Filaments linear-subulate. Unarmed, the flowers in terminal cymes.

CLAUSENA. Filaments dilated at the base. Unarmed, the flowers in panicles or racemes.

‡ ‡ Cotyledons crumpled, leafy. Petals valvate.

MICROMELUM. Filaments linear-subulate. Unarmed, the flowers in terminal corymbs.

O O Leaves digitately 3-foliolate.

LUVUNGA. Calyx cup-shaped. Stamens 8 or 10. Armed or not.

• • Ovules solitary in each cell.





TRIPHASIA. Calyx 3-lobed. Stamens 6. Spiny; leaves digitately 3-foliolate; flowers almost solitary.

LIMONIA. Calyx 4- or 5-lobed or -parted. Stamens 8—10. Armed; leaves pinnate.  
+ + Leaves 1-foliolate or simple.

PARAMIONYA. Anthers linear-oblong. Disk elongate. Calyx usually cup-shaped. Climbers, armed. Berries without pulp.

ATALANTIA. Anthers ovate or cordate. Disk cup-shaped. Calyx often irregular. Trees or shrubs, often armed. Berries with vesicular pulp.

× × Ovary-cells with numerous ovules.

+ Rind of berry leathery. Leaves 1-foliolate.

CITRUS. Stamens 20—60, often connate. Trees, usually spiny.

+ + Rind of berry woody. Leaves compound. Trees.

FERONIA. Ovary 5—6-celled. Leaves pinnate.

ABOLE. Ovary 8- to many-celled. Leaves trifoliolate.

### Evodia, Forst.

#### Conspectus of species.

× Panicles small, contracted, usually much shorter than the petioles.

Branchlets 4-cornered and marked with 4 prominent longitudinal lines; leaves 1—3-foliolate, the leaflets sessile; stamens shorter than the petals, ..... *E. viticina*.

Branchlets quite terete; leaves 8-foliolate, the leaflets on short petiolules, lively green, .. *E. triphylla*.

× × Panicles corymbose, spreading, as long or longer than the petiole.

Branchlets terete, thick; leaflets shortly petioluled, dark bluish-green, *E. Roxburghiana*.

1. *E. VITICINA*, Wall. Cat. 1219; Hf. Ind. Fl. I. 489.

HAB. Tenasserim, Tavoy.

2. *E. TRIPHYLLA*, DC. Prod. I. 724; Hf. Ind. Fl. I. 488.

HAB. Frequent in the damp hill-forests, and entering the drier ones, from Martaban down to Tenasserim, at 3000 to 5000 ft. elevation.—Fl. Febr., March; Fr. Apr., May.

3. *E. ROXBURGHIANA*,\* Bth. Fl. Hongk. 59; Hf. Ind. Fl. I. 487.—(*Xanthoxylon triphyllum*, Wight Jc. t. 204; *Fagara triphylla*, Roxb. Fl. Ind. I. 416).

HAB. Tenasserim.

Roxburgh's figure of the fruit in his MS. drawings shews that the size of the carpels and seeds does not differ from that of the plant formerly usually taken for *E. triphylla*.

### Melicope, Forst.

1. *M. ? HELFERI*, Hf. Ind. Fl. I. 492.

HAB. Tenasserim (or Andamans?) (*teste* Hf.).

### Zanthoxylum, L.

#### Conspectus of species.

\* Cymes axillary, or axillary and terminal. Branches alternate. Leaves pinnate.

× Rachis of leaves winged. Flowers apetalous.





Leaflets 2—3 in. long, glandular-crenulate; cymes dense,  $\frac{1}{2}$ —1 in. long; fruit-carpels usually by 4—2, ..... *Z. acanthopodium*.

Leaflets coarsely crenate,  $\frac{1}{2}$ —1 in. long, ..... *Z. Andamanicum*.

× × Rachis of leaves not winged. Flowers 4—5-petalous.

Leaflets in 2—3 pairs, glossy on both sides; cymes axillary, ..... *Z. Hamiltonianum*.

\* \* Cymes terminal. Branches opposite.

Leaflets glandular-crenate, in 7—10 pairs, ..... *Z. Budrunga*.

1. *Z. ACANTHOPODIUM*, DC. Prod. II. 727; Hf. Ind. Fl. I. 493.

HAB. Ava, hills east of Bhamo.

2. *Z. ANDAMANICUM*, Kurz MS.

HAB. In the tropical forests of Termoklee island, west of South Andaman.

A very distinct small-leaved species, but the flowers and fruits are unknown.

3. *Z. HAMILTONIANUM*, Wall. Cat. 7117; Hf. Ind. Fl. I. 494.

HAB. Burma (*teste* Hf.).

4. *Z. BUDRUNGA*, DC. Prod. I. 728; Hf. Ind. Fl. I. 495. (*Eagara Budrunga*, Roxb. Fl. Ind. I. 447).

HAB. Not unfrequent in the tropical and moister upper mixed forests from Chittagong, Pegu, and Martaban down to Tenasserim.—Fr. Sept.

#### *Doubtful species.*

1. *Z. spondiaefolium*, Wall. Cat. 1217; Hf. Ind. Fl. I. 496.

HAB. Amherst (Wall.) *teste* Hf.

#### *Acronychia*, Forst.

1. *A. CYMINOSMA*, F. Muell. Fragm. Phyt. Amstr. I. 27. (*A. laurifolia*, Bl. Bydr. 245; Hf. Ind. Fl. I. 498; *Cyminosma pedunculata*, DC. Prod. I. 722; Wight Ill. t. 65).

HAB. Not unfrequent in the tropical forests of the Andamans; also Pegu and Chittagong.—Fl. RS.

#### *Toddalia*, Juss.

1. *T. ASIATICA*, (*Paullinia Asiatica*, L. sp. pl. 524; *T. aculeata*, Pers. Ench. I. 249; Hf. Ind. Fl. I. 497 (excl. syn. *Zanthox. nitidum*, Wall.) Wight Ill. t. 66; *Scopolia aculeata*, Sm. Icon. ined. sub. t. 34; Roxb. Fl. Ind. I. 616).

VAR.  $\alpha$ . ACULEATA, (*T. aculeata*, Pers.), petioles and often also the midrib beneath hooked-prickly; panicles usually smaller and less branched.

VAR.  $\beta$ . FLORIBUNDA, (*T. floribunda*, Wall. Pl. As. rar. III. 17. t. 232), petioles and midrib of leaves unarmed; panicles often more compound.

HAB. Frequent in the tropical forests from Ava and Martaban down to Pegu, up to 3000 ft. elevation.—Fl. June.





*N. B.*—It is possible that in Wallich's Herbarium *Toddalia* and *Zanthoxylon nitidum*, DC., are mixed, but the Wallichian specimens in HBC., as well as those cultivated in this garden, all belong to DeCandolle's species.

**Glycosmis, Correa.**

*Conspectus of species.*

\* *Anthers blunt, not gland-tipped.*

O Berries oboval-oblong to oblong, leaden blue.

Petals longer persistent; filaments flat, from a narrower base gradually broader towards the triangular apex; bark pale coloured, ..... *G. cyanocarpa*.

O O Berries more or less globular, from watery flesh-coloured to crimson.

Petals very deciduous; filaments from a broader base attenuated upwards; nerves of leaflets prominent above; bark pale coloured, ..... *G. trifoliata*.

Petals very deciduous, lanceolate, about 3 lin. long; filaments elongate, filiform; bark brown, ..... *G. arborea*.

\* \* *Anthers gland-tipped.*

Petals longer persistent, about  $1\frac{1}{2}$  lin. long; anthers cordate; filaments flat, from a narrower base gradually broader towards the triangular apex; bark white, ..... *G. pentaphylla*.

1. *G. CYANOCARPA*, Spreng. Syst. Veg. IV/2. 161; Miq. Fl. Ind. Bat. I/2. 521.—(*Cookia cyanocarpa*, Bl. Bydr. 136).

VAR.  $\alpha$ . *GENUINA*, flowers in peduncled terminal and axillary panicles, rarely reduced to cymes.

VAR.  $\beta$ . *CYMOSA*, (*G. tetraphylla*, Wall. and *G. oxyphylla*, Wall. ap. Voigt. Cat. Hort. Calc. 139), flowers in short peduncled or almost sessile quite glabrous or rarely rusty tomentose cymes axillary or axillary and terminal, rarely transformed into panicles.

HAB. Var.  $\beta$ . Not unfrequent in the tropical forests of the Pegu Yomah.—Fl. Apr.

2. *G. TRIFOLIATA*, Spreng. Syst. Veg. IV/2 162; Miq. Fl. Ind. Bat. I/2. 521.

VAR.  $\alpha$ . *GENUINA*, leaves green or yellowish in drying; panicles or cymes shorter, more or less rusty or tawny tomentose; ovary glabrous or tawny pubescent.

VAR. ?  $\beta$ . *FUSCESCENS*, leaves fuscous in drying; panicles larger and more compound, quite glabrous.

HAB. Var.  $\alpha$ . In Chittagong and Tenasserim; var.  $\beta$ . frequent in the tropical forests all over Burmah from Chittagong, Pegu, and Martaban down to Tenasserim and the Andamans.—Fl. HS.; Fr. RS.

All the specimens of var.  $\beta$ . are in young bud only, and therefore the identification with *G. trifoliata* is doubtful. Those of var.  $\alpha$ . are in young bud only and also doubtful; they can equally well belong to *G. insularis*.

3. *G. ARBOREA*, Corr. in Ann. Mus. VI. 386.; DC. Prod. I. 538. (*Limonia arborea*, Roxb. Corom. Pl. I. t. 85. and Fl. Ind. II. 381).





VAR.  $\alpha$ . GENUINA, calyx-lobes acute; ovary sessile; leaves often serrate; panicles peduncled.

VAR.  $\beta$ . INSULARIS, calyx-lobes bluntish; ovary usually stalked; leaves entire; cymes small, sessile, rusty-villous.

HAB. Var.  $\beta$ . Common in the tropical forests of the Andamans.—Fl. Febr.; Fr. Apr. May.

4. G. PENTAPHYLLA, Corr. in Ann. Mus. VI. 386; DC. Prod. I. 538; WA. Prod. I. 93; Bedd. Fl. Sylv. Madr. Anal. 43. t. 6. f. 6. (*Limonia pentaphylla*, Retz. Obs. V. 24; Roxb. Corom. Pl. t. 84. and Fl. Ind. II. 381; *Limonia arborea*, Bot. Mag. t. 2074).

HAB. Frequent all over Burmah, in the mixed and tropical forests, and more especially in the shade of village-bushes and bamboo-jungles.—Fl. CS.; Fr. HS.

### Chalcas, L. (1767) (*Murraya*, L. 1771).

#### *Conspectus of species.*

Leaflets 3 to 8; petals nearly  $\frac{1}{2}$  in. long, ..... *C. paniculata*.  
Leaflets 10 to 20; petals about 2 lin. long, ..... *C. Kænigii*.

1. C. PANICULATA, L. Mant. 126i; F. Muell. in Contr. New Hebrid. 7.—(*Murraya exotica*, L. Mant. 563; Hf. Ind. Fl. I. 502).

HAB. Common in the tropical forests of the Pegu Yomah and Martaban down to Tenasserim and the Andamans.—Fl. HS.; Fr. May, June.

2. C. KÆNIGII, (*Murraya Kænigii*, Spreng. Syst. veg. II. 315; Hf. Ind. Fl. I. 503.—(*Bergera Kænigii*, L. Mant. 563; Roxb. Corom. Pl. II. t. 112. and Fl. Ind. II. 375; Wight Icon. t. 13; Griff. Not. Dicot. 497. t. 586. f. 3; *Murraya foetidissima*, T. et B. in Tydsch. Ned. Ind. XXV. 25).

HAB. Rather frequent along choungs in the tropical forests of the eastern slopes of the Pegu Yomah; also Chittagong.—Fl. March.

#### *Doubtful species.*

1. *Murraya elongata*, DC. ap. Hf. Ind. Fl. I. 503.

HAB. Ava, Taong-dong (Wall.).

### Clausena, Burm.

#### *Conspectus of species.*

##### \* *Panicle terminal.*

O Ovary glabrous.

Softly villous; leaves pinnately 5-foliolate; flowers 4-merous, ..... *C. macrophylla*.  
Inflorescence and leaves glabrous; petiole and rachis terete or nearly so; leaflets usually 7 (5—9), not or hardly oblique; flowers usually 4- rarely 5-merous, *C. heptaphylla*.

Inflorescence and leaves glabrous; rachis more or less winged; leaflets 13—17, oblique; flowers 5-merous, ..... *C. Wallichii*.

O O Ovary more or less hirsute or pubescent.

Inflorescence and other parts more or less shortly hirsute or puberulous; rachis terete;





leaflets 15—30, oblique; flowers 5-merous, ..... *C. excavata*,  
 Inflorescence and the tubercled petioles densely and shortly tawny tomentose; leaflets  
 5—9; young berries densely fascicled-tomentose; flowers 5-merous, .... *C. Wampi*.

\* \* *Panicles or racemes axillary.*

All parts shortly pilose; leaflets 5 to 17; ovary and the long red berries glabrous;  
 flowers 4-merous, ..... *C. suffruticosa*.

1. *C. MACROPHYLLA*, Hf. Ind. Fl. I. 504.

HAB. Upper Tenasserim, banks of Salween at Troglā.

2. *C. HEPTAPHYLLA*, WA. Prod. I. 95; Hf. Ind. Fl. I. 504.--(*Amyris heptaphylla*, Roxb. Fl. Ind. II. 248).

HAB. Chittagong; Tenasserim (*teste* Hf.).

3. *C. WALLICHII*, Oliv. in Journ. Linn. Soc. V. Suppl. II. 35; Hf. Ind. Fl. 505.--(*Cookia* sp., Griff. Not. Dicot. 469. t. 587. f. 2?). VAR.  $\beta$ . LUXURIANS, rachis leafy-winged; leaflets only in 4—2 pairs with an odd one, 4—8 in. long, remaining green in a dried state.

HAB. Var.  $\alpha$ . Upper Tenasserim; var.  $\beta$ . rare in the tropical forests of the eastern slopes of the Pegu Yomah. Fl. March.; Fr. Apr.

4. *C. EXCAVATA*, Burm. Fl. Ind. 87; Hf. Ind. Fl. I. 504.--(*Amyris Sumatrana*, Roxb. Fl. Ind. II. 250; *Amyris punctata*, Roxb. l. c. 251.)

HAB. Frequent in the tropical and moister upper mixed forests, all over Burmah and the adjacent provinces, from the plains up to 2000 ft. elevation. Fl. Apr. May; Fr. June, Jul.

\*5. *C. WAMPI*, Blanco Fl. Filip. 358; Hf. Ind. Fl. I. 505.--(*Cookia punctata*, Sonner. Voy. II. 130. t. 131; Roxb. Fl. Ind. II. 382).

HAB. Cultivated in Chittagong.

6. *C. SUFFRUTICOSA*, WA. Prod. I. 96. in adn.; Hf. Ind. Fl. I. 506.--(*Amyris suffruticosa*, Roxb. Fl. Ind. II. 250).

VAR.  $\beta$ . PAUCIJUGA, leaflets only in 2 to 3 pairs with an odd one.

HAB. Chittagong, Seetakhoond hills; var.  $\beta$ . not unfrequent in the Eng. and dry forests of the Prome district.—Fl. March.

### Micromelum, Bl.

#### Conspectus of the species.

Tree; petals  $2\frac{1}{2}$  lin. long; ovary slightly appressed-pubescent; young berries stalked glabrous, ..... *M. pubescens*.

Meagre shrub up to 4 ft. high; petals 2 lin. long; ovary densely tawny hirsute; young berries sessile or nearly so, puberulous, ..... *M. hirsutum*.

I. *M. PUBESCENS*, Bl. Bydr. 138; Hf. Ind. Fl. I. 501.--(*Bergera integerrima*, Roxb. Fl. Ind. III. 376.)

VAR.  $\alpha$ . GENUINA, leaves on both sides or at least along the nerves beneath, the petioles, and rachis puberulous.

VAR.  $\beta$ . GLABRIUSCULA, leaves quite glabrous.

HAB. Both varieties frequent in the tropical and moister upper mixed



forests all over Burma from Chittagong and Ava down to Tenasserim and the Andamans.—Fl. Jan. March ; Fr. Apr. June.

2. *M. HIRSUTUM*, Oliv. in Linn. Proc. V. Suppl. II. 41 ; Hf. Ind. Fl. I. 502.—(*M. Zeylanicum*, Wight in Thw. C. P. 188).

VAR.  $\alpha$ . *GENUINUM*, all parts more or less shortly hirsute or puberulous ; leaflets smaller.

VAR.  $\beta$ . *GLABRESCENS*, (*Aurantiacea*, Wall. Cat. 8517.) the young shoots only tawny puberulous, all other parts glabrous or nearly so ; calyx shortly 5-toothed, puberulous ; petals puberulous.

HAB. VAR.  $\alpha$ . Very frequent in the open and dry forests, especially in the Eng-forests, all over Burma from Ava and Martaban down to Tenasserim ; var.  $\beta$ . in Tenasserim from Moulmein southwards (Helf. 535/1).—Fl. March, Apr.

### Luvunga, Ham.

#### Conspectus of species.

Filaments glabrous, more or less connate, ..... *L. scandens*.  
Filaments glabrous, free ; flowers much smaller, ..... *L. eleutherandra*.

1. *L. SCANDENS*, Ham. ap. Oliv. in Linn. Proc. V. Suppl. II. 43 ; Hf. Ind. Fl. I. 509 ; Rot. Mag. t. 4522.—*Limonia scandens*, Roxb. Fl. Ind. II. 380).

HAB. Burma (Ava ?) ; Chittagong.

2. *L. ELEUTHERANDRA*, Dalz. in Hook. Kew. Journ. Bot. II. 258 ; Hf. Ind. Fl. I. 509, excl. syn. Bl.—(*Luvunga Tavoyana*, Wall. Cat. 6383).

HAB. Tenasserim, ? Tavoy, (teste Hf.)

### Triphasia, Lour.

1. *T. TRIFOLIATA*, DC. Prod. I. 536 ; Hf. Ind. Fl. I. 507.

HAB. Tenasserim, probably wild.—Fl. Fr.  $\infty$ .

### Limonia, L.

#### Conspectus of species.

Spiny tree ; leaflets opposite ; inflorescence puberulous ; berries globose, sessile  
..... *L. acidissima*.

Unarmed shrub ; leaflets alternate ; inflorescence glabrous ; berries ovoid, shortly stalked, ..... *L. alternans*.

1. *L. ACIDISSIMA*, L. sp. pl. 554 ; Hf. Ind. Fl. I. 507.—(*L. crenulata*, Roxb. Corom. Pl. I. t. 86. and Fl. Ind. II. 381).

VAR.  $\beta$ . *PUBESCENS* (*L. ? pubescens*, Wall. Cat. 6365 ; Hf. Ind. Fl. I. 507), prickles on the branches short, the wings of the petiole narrow, leaflets bluntish, the terminal one long but bluntish acuminate, the petioles and nerves beneath softly puberulous.





HAB. Var.  $\alpha$ . Ava, along the Irrawaddi, apparently frequent; var.  $\beta$ . Ava, Taong dong; and Prome hills.

2. L. ALTERNANS, Wall. ap. Voigt. Hort. Calc. 139; Hf. Ind. Fl. I. 508.

HAB. Not unfrequent in the upper-mixed, and sometimes in the moist, forests of the Pegu Yomah and Arracan; also Tenasserim, Mergui.—Fl. May.

### Paramignya, Wight.

#### Conspectus of species.

\* Petals about 8 lin. long. Calyx largish, cupular, broadly lobed.

Style elongate; calyx and pedicels tomentose, the latter as long or a little longer than the calyx, ..... *P. monophylla*.

Style short; calyx and the pedicels glabrous, the latter 1 in. or thereabouts long, ..... *P. grandiflora*.

\* \* Petals 2—4 lin. long. Calyx small, with acute lobes.

O Berries terete.

Young shoots more or less puberulous; style short, hirsute or villous, ... *P. Griffithii*.

Glabrous; style very short, like the ovary glabrous, .... *P. citrifolia*.

O O Berries 3—4-angular.

Erect tree, the spines 1—1½ in. long, straight; calyx glabrous, ..... *P. angulata*.

1. *P. MONOPHYLLA*, Wight Ill. I. 108. t. 42; Hf. Ind. Fl. I. 510.—

HAB. Tenasserim, Moulmein district at 5000 feet elevation (*teste* Oliv.).

2. *P. GRANDIFLORA*, Oliv. in Linn. Proc. V. Suppl. II. 42; Hf. Ind. Fl. I. 510.

HAB. Tenasserim, Tavoy.—Fl. Aug.

3. *P. GRIFFITHII*, Hf. Ind. Fl. I. 510.—(*Citrus scandens*, Geoff. Not. Dicot. 495, t. 587. f. 1).

HAB. Ava, at the serpentine mines of Hookhum valley; Pegu (*teste* Hf.).

4. *P. CITRIFOLIA*, Hf. Ind. Fl. I. 510, non Oliv.—(*Limonia citrifolia*, Roxb. Fl. Ind. II. 579.; *P. micrantha*, Kurz in And. Rep. App. B. 4).

HAB. In the tropical forests of Chittagong and the Andamans.—Fl. June, July.

5. *P. ANGULATA* (*Citrus angulatus*, Willd. sp. pl. III. 1426; DC. Prod. I. 540; *Limonellus angulosus*, Rumph. Herb. Amb. 110. t. 32; *Limonia angulosa*, WA. Prod. I. 91, in adn.; Miq. Fl. Ind. Bat. I. 2-521; *Atalantia longispina*, Kurz in Journ. As. Soc. Beng. 1872. 295; *Paramignya longispina*, Hf. Ind. Fl. I. 511; *Gonocitrus angulatus*, Kurz in Journ. As. Soc. Beng. 1873. 228. t. 18).

HAB. In the mangrove and tidal forests of Pegu and Tenasserim (also Sunderbuns, Malacca, and the Moluccos).





N. B.—This species has got quite an array of synonyms. I attempted to establish a new genus upon it on account of the angular fruits and absence of pulp, but on examining the fruits of several other *Paramignyas*, I find that they also seem to be pulpless.\* *Atalantia missionis*, Oliv. (Hf. Ind. Fl. I. 513, excl. syn. Turcz.) has curiously enough retained its place in *Atalantia*, although habit and generic characters place it beyond any doubt in *Paramignya*, and in habit it approaches very much the above species.

### *Atalantia*, Corr.

#### *Conspectus of species.*

× Calyx irregularly lobed, split to the base on one side.

Berries the size of a large pea or small cherry, ..... *A. monophylla*.

Berries the size of a wood-apple, ..... *A. macrophylla*.

× × Calyx regularly 4-lobed.

Flowers shortly pedicelled, in short racemes, ..... *A. caudata*.

1. *A. MONOPHYLLA*, Corr. in Ann. du Mus. VI. 383; Hf. Ind. Fl. I. 511.—(*A. floribunda*, Wight. Icon. t. 1611.; *Limonia monophylla*, Lin. Mant. alt. 237; Roxb. Fl. Ind. II. 378 and Corom. Pl. I. t. 82; *A. puberula*, Miq. Ann. Mus. Lugd. Bat. I. 211; *Ohilocalyx ellipticus*, Turcz. in Bull. Natur. Mosc. 1863, 588).

HAB. Ava, about Segain, very frequent.—Fl. Octob.

2. *A. MACROPHYLLA* (*A. monophylla* var. *macrophylla*, Oliv. in Linn. Proc. V. Suppl. II. 24; Hf. Ind. Fl. I. 512).

HAB. Frequent along the beaches of the Andaman islands; also Tenasserim.—Fr. Apr. May.

3. *A. CAUDATA*, Hf. Ind. Fl. I. 513?—

HAB. Frequent in the tropical forests of the Pegu Yomah, especially along choungs.

The Burmese plant is a middling-sized tree of elegant appearance but spiny. I have not met either with flowers or fruits and therefore the identification must remain doubtful.

### *Citrus*, L.

#### *Conspectus of species.*

× Young shoots and nerves of leaves beneath pubescent or puberulous; flowers and fruits large, ..... *C. decumana*.

× × All parts glabrous.

O Style very short.

Flowers small; stamens free; petioles leafy and almost as long and as broad as the blade itself, ..... *C. hystrix*.

O O Style as long as the ovary or much longer.

† Petals 8 to 10 lin. long.

\* The berries of *P. littoralis*, Miq., a species nearly allied to *P. angulata*, has pulp, but the dried ones appear pulpless.





Leaves acuminate or acute, the petiole often winged; berries globular, without a knob; filaments cohering by 3—4, ..... *C. Aurantium*.

Leaves blunt or nearly so, the petiole not winged; berries oblong to globose, with a knob, the skin usually thick; filaments free or polyadelphous, ..... *C. medica*.

+ + Petals 3—4 lin. long.

Calyx small; berries globular, sweet or acid, the skin usually thin, ..... *C. nobilis*.

\*1. *C. DECUMANA*, L. sp. pl. 1100; Roxb. Fl. Ind. III. 393; Hf. Ind. Fl. I. 516.

HAB. Often cultivated by Burmans, especially in the southern provinces.

2. *C. HYSTRIX*, DC. Prodr. I. 539; Hf. Ind. Fl. I. 515.

HAB. Not unfrequent in the tropical forests of the Martaban hills; also in the adjoining Siamese province Kyouk-Koung; often cultivated in native gardens.

\*3. *C. AURANTIUM*, L. sp. pl. 1100; Hf. Ind. Fl. I. 515.

HAB. Here and there cultivated in villages.

4. *C. MEDICA*, L. sp. pl. 580; Roxb. Fl. Ind. III. 392; Hf. Ind. Fl. I. 514, exl. var. 4.

VAR.  $\alpha$ . *GENUINA*, Brandis Forest. Fl. 52.; Hf. l. c.

VAR.  $\beta$ . *LIMONUM*, Brand. For. Fl. 52.

VAR.  $\gamma$ . *ACIDA*, Brand. For. Fl. 52; Hf. l. c.—(*C. acida*, Roxb. Fl. Ind. III. 390).

HAB. Var.  $\gamma$ . apparently wild in the Khaboung forests of the Pegu Yomah, west of Tounghoo (Brandis); the other varieties only cultivated.

\*5. *C. NOBILIS*, Lour. Fl. Cochin. 569; DC. Prodr. I. 540.; Ker Bot. Rep. t. 211; Andr. Bot. Rep. t. 608 (*Aurantium Sinense*, Rumph. Herb. Amb. II. t. 34; *C. medica* var. 4 *limetta*, Brandis For. Fl. 52; Hf. Ind. Fl. I. 515).

VAR.  $\alpha$ . *SINENSE*, (*Aurantium Sinense*, Rph. l. c.), petioles simple; berries with a sweet or bitter pulp. Sweet lime.

VAR.  $\beta$ . *LIMONELLUS*, (*Limonellus*, Rumph. l. c. t. 29; *C. limetta*, Wight Ic. t. 958), petioles short, winged; fruits acid. Acid lime.

HAB. Frequently cultivated in villages.

#### **Feronia, Corr.**

1. *F. ELEPHANTUM*, Corr. Act. Soc. Linn. V. 224; Roxb. Corom. Pl. II. t. 141. and Fl. Ind. II. 411; Wight Icon. t. 15.; Hf. Ind. Fl. I. 516.

HAB. In the dry forests of Prome District.—Fl. March, Apr.; Fr. Octob.



**Aegle, Corr.**

1. *A. MARMELOS*, Corr. Act. Soc. Linn. V. 224; Roxb. Corom. Pl. II. t. 143 and Fl. Ind. II. 579; Wight Icon. t. 16; Hf. Ind. Fl. I. 516; Bedd. Fl. Sylv. t. 161.

HAB. Much cultivated, especially in the Prome district, and said to occur wild in the forests also: I found the tree in those of the Toukyeghat, east of Tounghoo.—Fl. May; Fr. Octob. Nov.

**SIMARUBEÆ.***Conspectus of genera.*

*Trib. I. SIMARUBEÆ.* Ovary deeply lobed or the carpels distinct.

\* Stamens twice as many as petals.

O Leaves simple.

*SAMADERA.* Calyx 3—5-parted. Disk large. Stamens 8—10. Drupe variously winged.

O O Leaves pinnate.

*AILANTHUS.* Calyx 5-cleft. Disk 10-lobed. Stamens 10. Fruit of 1 to 5 samaras.

\* \* Stamens as many as petals. Leaves pinnate. Carpels drupaceous.

O Styles free or cohering at the base only.

*BRUCEA.* Disk 4-lobed. Stamens glabrous. Flowers cymose-racemose.

O O Styles connate. Flowers in panicles.

*PICRAMMA.* Disk thick. Stamens pilose.

*EURYCOMA.* Disk none. Stamens glabrous.

*Trib. II. PICRAMNIEÆ.* Ovary entire, 2—5-celled.

*HARRISONIA.* Calyx 4—5-cleft. Stamens 4 or 10. Ovary 4—5-celled. Leaves pinnate, or pinnately 1—3-foliate.

*BALANITES.* Sepals 5. Stamens 10. Ovary 5-celled. Leaves bifoliate.

**Samadera, Gärtn.**

1. *S. INDICA*, Gärtn. Fruct. II. t. 156. fig. inf.; Wight Ill. t. 68; Hook. Icon. Pl. t. 7; Hf. Ind. Fl. I. 519.

VAR. *α. GENUINA*, peduncles about as long as the leaves; drupes about 2½ in. long, smooth or slightly net-veined; filaments in bud erect.

VAR. *β. LUCIDA*, (*Niota lucida*, Wall. Pl. As. rar. II. t. 168; *Samadera lucida*, Benn. in Hf. Ind. Fl. I. 519; *S. brevipetala*, Scheff. Obs. phyt. 88), peduncles shorter than the leaves; drupes 1½—2 in. long, strongly net-veined; filaments in bud twisted.

HAB. Var. *β.* Upper Tenasserim, Moulmein.

**Ailanthus, Desf.**

1. *A. MALABARICUS*, DC. Prod. II. 89; Wight Icon. t. 1604; Bedd. Fl. Sylv. t. 122; Hf. Ind. Fl. I. 518.

HAB. Rather rare in the tropical forests of the Khaboung valley, eastern slopes of Pegu Yomah. Fr. Apr.



**Brucea, Mill.***Conspectus of species.*

Leaflets coarsely crenate-toothed; drupes about 2 lin. long, ..... *B. Sumatrana*.

Leaflets quite entire; drupes about 3—4 lin. long, ..... *B. mollis*.

1. *B. SUMATRANA*, Roxb. Fl. Ind. I. 449; Hf. Ind. Fl. I. 521.

HAB. Tenasserim, Mergui (Griff.)

2. *B. MOLLIS*, Wall. Cat. 8483; Hf. Ind. Fl. I. 521.

HAB. In the drier and damp hill-forests of Martaban and Upper Tenasserim, at 3000 to 4000 ft. elevation.—Fl. March.

**Picrasma, Bl.**

1. *P. JAVANICA*, Bl. Bydr. 248; Benn. in Horsf. Pl. Jav. rar. 197. t. 41; Miq. Fl. Ind. Bat. I/2. 679. t. 28; Hf. Ind. Fl. I. 520.—(*P. Andamanica*, Kurz And. Rep. App. B. IV; Hf. Ind. Fl. I. 520).

HAB. Frequent in the tropical forests from Martaban down to Tenasserim and the Andaman islands; rare in those of the Pegu Yomah.—Fl. March; Fr. Begin of R. S.

**Eurycoma, Jack.**

1. *E. LONGIFOLIA*, Jack in Roxb. Fl. Ind. ed. 1. II. 307; Griff. Not. Dicot. 435; Hf. Ind. Fl. I. 521.—(*E. Merguensis*, Planch. in Hook. Lond. Journ. V. 583).

HAB. Forests of Tenasserim from Tavoy southwards; Andamans (*teste* Bennet).

**Harrisonia, R. Br.**

1. *H. BENNETII*, Bth. and Hf. Gen. pl. I. 314; Hf. Ind. Fl. I. 519.—(*Lasiolapis paucijuga*, Benn. in Horsf. Pl. Jav. rar. 202. t. 42).

HAB. Very frequent in the dry forests of the Prome district; also in Martaban, Yoonzeleen, 2000 ft. (Brandis).—Fl. Apr.

**Balanites, Del.**

1. *B. ROXBURGHII*, Planch. in Ann. sc. nat. 4 ser. II. 258; Hf. Ind. Fl. I. 522.—(*Ximenia Aegyptiaca*, Roxb. Fl. Ind. II. 253; *B. Aegyptiaca*, Wight Icon. t. 274, non Del.).

VAR.  $\beta$ . *GRACILIS*, branchlets slender and glabrous or nearly so; inflorescence more glabrous than in the normal form and only puberulous, the peduncles and pedicels all very slender.

HAB. Ava; var.  $\beta$ . in the Prome District.—Fl. Apr.

**OCHNACEÆ.***Conspectus of genera.*

Trib. I. *OCHNEÆ*. Ovary 2—10-celled, with a solitary ovule in each cell. Albumen none.





OCHNA. Stamens indefinite. Drupes 3 to 10, seated on the enlarged torus. Corymbs lateral.

GOMPHIA. Stamens 10. Drupes 3—5, seated on the enlarged torus. Panicles terminal.

TETRAMERISTA. Flowers 4-merous. Stamens 4. Fruit a coriaceous 4-seeded berry.

Trib. II. EUTHEMIDÆ. Ovary half 5-celled, with 2 ovules in each cell. Seeds with albumen.

EUTHMIS. Stamens 5. Racemes terminal.

### Ochna, Schreb.

#### Conspectus of species.

\* Styles free at the summit for nearly a line length.

Fruiting sepals erect-conniving; filaments as long or longer than the anthers; tree, ..... *O. Andamanica*.

\* \* Styles united to the apex.

× Filaments as long or longer than the anthers.

Petals usually 5; fruiting sepals reflexed; tree, ..... *O. Wallichii*.

Petals 5; fruiting sepals erect-connivent; dwarf shrub, ..... *O. fruticulosa*.

× × Filaments almost 4 times shorter than the anthers.

Petals usually 7—8; fruiting sepals erect-conniving; tree, ..... *O. squarrosa*.

1. *O. ANDAMANICA*, Kurz in Journ. As. Soc. Beng. 1872, 295.

HAB. Frequent in the tropical forests of the Andamans.—Fl. March; Fr. May, June.

2. *O. SQUARROSA*, Roxb. Corom. Pl. I. t. 89 and Fl. II. 643; Wight Ill. t. 69. (*O. lucida*, Lamk. Dicot. IV. 510).

HAB. Ava (Mrs. Col. Burney).

3. *O. WALLICHII*, Planch. in Hook. Lond. Journ. V. 650; Hf. Ind. Fl. I. 524, excl. syn. Colebr. and Kurz. (*O. obtusata*, Wall. Cat. 28051; *O. lucida*, Griff. Not. Dicot. 464).

HAB. Very frequent in the tropical forests of Martaban and Tenasserim; less so along the eastern and southern slopes of the Pegu Yomah.—Fl. March; Fr. Apr. May.

4. *O. FRUTICULOSA*, Kurz in Journ. As. Soc. Beng. 1872, 295.

HAB. Frequent in the open forests, especially the eng-forests, all over Pegu and Martaban.—Fl. Apr. May; Fr. June, July.

#### Doubtful species.

1. *O. parviflora*, Griff. Not. Dicot. 464.

HAB. Forests of Moulmein.

Referred by Bennet as a variety to *O. Wallichii*, from which it seems to differ by its smaller flowers. I have not seen a specimen and the reflexed sepals seem to confirm Mr. Bennet's conclusion.

2. *O. ? brevipes*, Planch. in Hook. Lond. Journ. Bot. V. 652; Hf. Ind. Fl. I. 525.

HAB. Pegu.



**Gomphia**, Schreb.

1. *G. SUMATRANA*, Jack. Mal. Misc. V. 29; Hf. Ind. Fl. I. 525.—(*G. Sumatrensis*, Planch. in Hook. Icon. t. 712; *Ochna crocea*, Griff. Not. Dicot. 463).

HAB. Tenasserim, Mergui, along the sea-coast of the island Madamaca, Pator. (Griff.).

N. B.—Mr. Bennet has a *Tetramerista glabra* var. *sagittata*, based upon *Ancistrocladus ? sagittatus*, Wall. Cat. 1055, a plant which I have not seen, and which on account of its sagittate-based leaves cannot be a *Tetramerista*. He gives Tenasserim as one of the localities for it.

**BURSERACEÆ.***Conspectus of genera.*

(In Burmese species the fruit is an indehiscent drupe.)

**GARUGA.** Torus broadly filling the urceolate calyx-tube. Calyx 5-cleft.

**BURSEREA.** Calyx small, 4—6-parted. Stamens 8—12, inserted at the base of the annular disk.

**CANARIUM.** Calyx 3-(rarely 2—5) cleft, valvate. Petals 3—5. Stamens 6—10. Drupes ovoid, more or less 3-angular, with a bony or hard putamen.

**Garuga**, Roxb.

1. *G. PINNATA*, Roxb. Corom. Pl. III. t. 208 and Fl. Ind. II. 400; Bedd. Fl. Sylv. t. 118; Hf. Ind. Fl. I. 528.

VAR. *α. GENUINA*, more glabrescent; drupes glabrous.

VAR. *β. MOLLIS* (*G. mollis*, Turcz. in Bull. Nat. Mosc. 1858, 457), more pubescent or villous, the drupes densely villous or pubescent.

HAB. Common in the mixed forests all over Burma from Chittagong and Ava down to Tennasserim and the Andamans, up to 3000 ft. elevation; var. *β.* with the typical form.—Fl. Febr. March; Fr. Begin. of R. S.

**Bursera**, L.

1. *B. SERRATA*, Wall. in Trans. Linn. Soc. XV. 362. t. 4.; Hf. Ind. Fl. I. 530.—(*Limonia pentagyna*, Roxb. Fl. Ind. II. 382).

HAB. Frequent in the tropical forests, especially along choungs, of the eastern slopes of the Pegu Yomah and Martaban.—Fl. Apr.

**Canarium**, L.*Conspectus of species.*

\* Stipules subulate, entire, very deciduous.

Leaflets serrulate; disk-glands smooth, 6, free, cohering by pairs, .... *C. euphyllum*.

Leaflets entire; disk-lobes 3, hairy, united into a cup, ..... *C. Bengalense*.

\* \* Stipules 2-cleft and pectinately cut, persistent.

Young buds covered by the crimson velvety bracts; leaflets entire and serrate, .. *C. coccineo-bracteatum*.





1. *C. EUPHYLLUM*, Kurz in Journ. As. Soc. Beng. 1872, 295 ; Hf. Ind. Fl. I. 535.

HAB. Frequent in the tropical forests of South Andaman.—Fl. June.

2. *C. BENGALENSE*, Roxb. Fl. Ind. III. 136 ; Hf. Ind. Fl. I. 534.

HAB. Very rare in the moister upper-mixed forests of the Pegu Yomah.

3. *C. COCCINEO-BRACTEATUM*, Kurz in And. Rep. App. B. 4. and Journ. As. Soc. Beng. 1872, 296 ; Hf. Ind. Fl. I. 536.

HAB. Rather rare in the tropical forests of South Andaman.—Fl. May.

*N. B.*—*C. nitidum*, Bennet = *C. patentissimum*, Miq. ; *C. grandiflorum*, Bennet = *C. Mahassan*, Miq. Besides these Maingay's No. 310 = *C. eupteron*, Miq., and ejusd. No. 307 = *C. rugosum*, Miq.

### MELIACEÆ.

#### Conspectus of genera.

A. Ovary-cells 1—2 ovuled. Seeds not winged.

*Trib. I. MELIÆ.* Stamens united into a tube. Albumen thin, fleshy. Cotyledons thin, leafy or plano-convex.

\* Capsule loculicidally 5-valved.

MUNRONIA. Calyx-lobes 5, almost leafy. Petals adnate to the elongate staminal tube. Disk tubular, sheathing the ovary. Leaves pinnate or pinnately 3-foliate.

\* \* Fruit a drupe.

MELIA. Calyx 5—6-parted. Petals free. Disk annular. Drupes containing a single 1—5-celled putamen. Leaves pinnate or decomposed.

CIPADESSA. Calyx 5-toothed. Petals free, short. Disk cupular. Drupes containing 5 horny pyrenes.

*Trib. II. TRICHILIÆ.* Stamens united into a tube, very rarely free. Ovary-cells with one or two, rarely more ovules. Albumen none. Cotyledons thick.

\* Disk free, tubular or cylindrical. Style usually elongate.

O Leaves pinnate (leaflets 5 or more).

DYSONYX. Calyx small, 4- or 5-toothed, opened while in young bud. Petals valvate, free. Ovary 3—5-celled. Capsule pear-shaped, opening loculicidally. Arillus none.

DIDYMOCHITON. Calyx small or large, consisting of 5—7 distinctly imbricate sepals. Petals valvate, adnate to the lobed or toothed staminal tube for nearly  $\frac{1}{4}$  of their length. Capsule globose, berry-like, opening loculicidally. Arillus none.

SCHIZOCHITON. Calyx usually campanulate, obscurely 4- rarely 5-toothed, open already in bud. Petals valvate or imbricate, united for  $\frac{1}{4}$  to nearly  $\frac{1}{2}$  of their length with the toothed or lobed staminal tube and appearing tubular. Ovary 3—4-celled. Capsule usually pyriform, opening loculicidally. Arillus complete or incomplete.

O O Leaves pinnately 3-foliate.

SANDORICUM. Calyx tubular. Petals imbricate. Berry globular, indehiscent.

\* \* Disk none, or annular or stalk-like, or confluent with the staminal tube. Style usually short or none.

† Anthers included, or almost included in the staminal tube. Seeds arillate.





AGLAIA. Petals 5. Anthers as many. Ovary 1—3-celled. Berry 1—2-celled, indehiscent.

AMOORA. Petals 3—5. Anthers twice as many or more than twice as many as petals. Ovary 3—5-celled. Capsule leathery, opening loculicidally.

† † Anthers exserted or the filaments upwards free.

WALSURA. Petals 5. Berry indehiscent or follicular-dehiscing along the suture. Seeds arillate.

B. Ovary-cells 3- to many-ovuled. Seeds usually winged.

*Trib. III. SWIETENIÆ.* Stamens united into a tube. Albumen present or not. Leaves pinnate.

CARAPA. Petals 4 or 5. Ovary-cells with 6 to 3 ovules. Capsule usually large, thick coriaceous, opening loculicidally. Seeds very large, with corky testa, without arillus, not winged.

SOYMIDA. Petals 5. Staminal tube cup-shaped, 10-lobed, the lobes 2-toothed. Disk rather broad. Seeds winged at both ends. Albumen none.

CHICKRASSIA. Petals 4 or 5. Staminal tube cylindrical, 10-crenate. Disk none. Seeds winged below. Albumen none.

*Trib. IV. CEDRELEÆ.* Filaments free, inserted outside of the disk. Valves of capsule separating from the axis. Seeds many. Leaves pinnate.

CEDRELA. Petals erect. Stamens 4—6. Disk raised or thin. Ovary 5-celled. Capsule opening septicidally. Seeds winged.

### Munronia, Wight.

1. *M. WALLICHII*, Wight. Ill. Ind. Bot. 147; Hf. Ind. Fl. I. 543.—(*Turraea pinnata*, Wall. Pl. As. var. II. 21. t. 119; Bot. Mag. t. 1413; *M. Neilgherria*, Wight Ill. I. 147. t. 54).

HAB. Rare on shady moist sandstone-rocks in the tropical forests of the central parts of the Pegu Yomah (Toung-nyo choung).—Fl. March.

### Melia, L.

#### Conspectus of species.

\* *Leaves simply pinnate. Ovary 3-celled.*

Leaflets entire, ..... *M. excelsa*.

Leaflets serrate; drupes small, by abortion one-celled and 1-seeded, .. *M. Azadirachta*.

\* \* *Leaves twice pinnate. Ovary and drupes 5—8-celled, some of the cells in fruit usually empty.*

× Drupes about  $\frac{1}{2}$  in. long, oblong or elliptical.

Leaflets serrate; staminal tube blue or dark lilac, slender, glabrous outside, about 3 lin. long, ..... *M. Azedarach*.

× × Drupes large, 1 in. long or longer. Staminal tube white.

Drupes ovate, hardly  $\frac{1}{2}$  in. thick, 5 or fewer-celled; staminal tube about  $1\frac{1}{2}$ —2 lin. long, glabrous outside; leaflets crenate or ultimately entire, ..... *M. dubia*.

Drupes twice as large, almost globose-obovoid, 5—8-celled; staminal tube 2 lin. long, woolly at the summit; flowers larger, scurvy-tomentose outside, .... *M. Birmanica*.



1. *M. EXCELSA*, Jack in Mal. Misc. I. 12; Griff. Not. Dicot. 499; Hf. Ind. Fl. I. 544.

HAB. Tenasserim, Mergui, probably cultivated.—Fl. Decb.

2. *M. AZADIRACHTA*, L. sp. pl. 550; Roxb. Fl. Ind. II. 394; Griff. Not. Dicot. 500; Bedd. Fl. Sylv. t. 14.; Hf. Ind. Fl. I. 544.—(*Azadirachta Indica*, A. Juss. in Mem. Mus. XIX. t. 13; Wight Icon. t. 17).

HAB. Not unfrequent in the dry forests of Prome District, especially on the higher ridges of the Yomah; also Ava.—Fl. March.

3. *M. AZEDARACH*, L. sp. pl. 550; Roxb. Fl. Ind. II. 395; Bot. Mag. t. 1066; Wight Icon. t. 160; Bedd. Fl. Sylv. t. 13; Hf. Ind. Fl. I. 544.—(*Melia sempervirens*, Sw. Prod. 67; Roxb. Fl. Ind. II. 395; Bot. Reg. t. 643; *M. sambucina*, Bl. Bydr. 162).

HAB. Prome and Ava, in and around villages, apparently only cultivated, wild in the adjoining Siamese provinces.—Fl. Febr. March; Fr. March, Apr.

4. *M. BIRMANICA*, Kurz in Journ. As. Soc. Beng. 1874. 183.

HAB. Frequent in the tropical forests of Martaban.—Fl. March, Apr.; Fr. Apr. May.

#### *Cipadessa*, Bl.

1. *C. BACCIFERA*, Miq. in Ann. Mus. Lugd. Bat. IV. b.—(*Melia baccifera*, Roth. Nov. sp. 215; *Ekebergia Indica*, Roxb. Fl. Ind. II. 392; *C. fruticosa*, Bl. Bydr. 162; Hf. Ind. Fl. I. 545; *Mallea Rothii*, A. Juss. in Mém. Mus. XIX. 222. t. 13. f. 6).

VAR.  $\alpha$ . *ROTHII*, leaflets coarsely serrate or serrate-toothed.

VAR.  $\beta$ . *INTEGERRIMA*, leaflets all entire.

HAB. Var.  $\beta$ . Ava, Taong-dong (Wall.)—Fl. Nov.

#### *Dysoxylum*, Bl.

##### *Conspectus of species.*

× Flowers in panicles.

Calyx petals and reproductive organs perfectly glabrous,.....*D. binectariferum*.

Calyx petals and staminal tube minutely pubescent,.....*D. procerum*.

× × Flowers in spikes or racemes.

Spikes arising from the trunk or old branches, densely flowered; leaflets opposite or nearly so, pale green,.....*D. cauliflorum*.

1. *D. BINECTARIFERUM*, Bedd. in Linn. Trans. XXV. 212; Hf. Ind. Fl. I. 546.—(*Guarea binectarifera*, Roxb. Fl. Ind. II. 240; *D. macrocarpum*, Thw. Ceyl. Pl. 60? Bedd. Fl. Sylv. t. 150?).

HAB. Chittagong; forests of South Andaman? (leaves only).—Fl. June; Fr. Febr.

2. *D. PROCERUM*, Hiern in Hf. Ind. Fl. t. 547.



HAB. Rare in the tropical forests of the southern slopes of the Pegu Yomah; more frequent in those of Tenasserim.—Fl. Decb.

N. B.—*D. brevipes*, Hiern = *D. costulatum*, Miq., in spite of a slight difference in the indument of ovary and tube.

3. *D. CAULIFLORUM*, Hiern in Hf. Ind. Fl. I. 549.

HAB. Tropical forests of South Andaman.

### Schizochiton, Bl.

#### Conspectus of species.

\* Flowers almost sessile or very shortly and robustly pedicelled.

Leaflets quite glabrous; anthers 6, ..... *Sch. dysoxylifolius*.

Leaflets softly pubescent beneath; anthers 6—7, ..... *Sch. grandiflorus*.

\* \* Flowers on slender pedicels.

Young parts and panicle and also the under-surface of leaves pubescent, *Sch. paniculatus*.

1. *SCH. DYSOXYLIFOLIUS*, Kurz in Journ. As. Soc. Beng. 1871. 49.—(*Chisogeton dysoxylifolius*, Hiern in Hf. Ind. Fl. I. 551).

HAB. Upper Tenasserim, Thounggyeen.—Fl. March.

2. *SCH. GRANDIFLORUS*, Kurz in Journ. As. Soc. Beng. 1872. 296.—(*Chisogeton grandiflorus*, Hiern in Hf. Ind. Fl. I. 552).

HAB. Frequent in the tropical forests of Martaban and Tenasserim.—Fl. March, Apr.

3. *SCH. PANICULATUS*, Hiern in Hf. Ind. Fl. I. 552.—(*Guarea paniculata*, Roxb. Fl. Ind. II. 242).

HAB. Burmah, probably Martaban (Brandis); Tenasserim, Tavoy (*teste* Hiern); Ava, on Taong dong (Wall. Cat. 8099. pp. mixed up with *Chickcrassia* leaves).

N. B.—*Chisogeton holocalyx*, Hiern = *Schizochiton patens*, Spreng.

### Sandoricum, Cav.

1. *S. INDICUM*, Cav. Diss. VII. t. 202. 203; Roxb. Fl. Ind. II. 392. and Corom. Pl. III. t. 261; Hf. Ind. Fl. I. 553.

HAB. Indigenous in the tropical forests of the southern slopes of the Pegu Yomah and in Tenasserim; much cultivated in Burmese villages.—Fl. Jan.; Fr. Apr. May.

### Aglaia, Lour.

#### Conspectus of species.

\* Inflorescence and often also the other parts more or less scaly especially while young.

× Leaflets usually in 2 or 1 pair with an odd one, nearly glabrous.



- Leaves pinnately 3-foliolate; panicles short and peduncled; scales of younger parts pale coloured, ..... *A. Chittagonga*.  
 Leaflets in 2 pairs with an odd one; scales of younger parts pale coloured; panicle small sessile, ..... *A. Andamanica*.  
 Leaflets in 2 pairs with an odd one; scales of younger parts rusty brown; panicles ample, about as long to half as long as the leaves, rather long-peduncled, *A. paniculata*.  
     × × Leaflets usually in 8—5 pairs with an odd one, beneath densely silvery or coppery scaly.  
 Panicle ample, densely silvery or coppery lepidote; flowers sessile, ..... *A. argentea*.  
     \* \* Calyx pedicels and usually the whole inflorescence rusty puberulous or tomentose from short stellate hairs.  
     × Leaflets in 6—8 or more pairs.  
 Leaflets beneath minutely and indistinctly scaly-tomentose, glabrescent, the lateral nerves all sharply prominent beneath; panicles, etc. rusty puberulous; flowers pedicelled; berries tawny velvety, ..... *A. crassinervia*.  
 Leaflets beneath sparingly fasciated-hairy, petiole panicle and nerves beneath densely rusty tomentose, ..... *A. Griffithii*.  
     × × Leaflets in 1 or 2 pairs with an odd one, rarely 1-foliolate.  
 Panicles slightly stellately pubescent, soon glabrous; calyx and pedicels glabrous; net-venation conspicuous, ..... *A. oligophylla*.

1. *A. CHITTAGONGA*, Miq. in Ann. Mus. Lugd. Bat. IV. 44.

HAB. Tropical forests of Chittagong and Arracan.

N. B.—Hiern apparently identifies the fruiting specimens No. 13 of Hb. Hf. and Th. with the perfectly different flowering ones collected by Griffith (viz. Nos. 1074 and 1066 Hb. Griff.) which belong to my *Amoora lactescens*.

2. *A. ANDAMANICA*, Hiern in Hf. Ind. Fl. I. 555.

HAB. Not unfrequent in the tropical forests of the Andamans.—Fr. Febr.

3. *A. PANICULATA*, Kurz Hb. 2043.

HAB. Rather rare in the tropical forests of the Pegu Yomah; Tenasserim (Helf. 1036—1037).

4. *A. ARGENTEA*, Bl. Bydr. 170; Miq. in Ann. Mus. Lugd. Bat. IV. 54.

HAB. Rare in the tropical forests of the eastern slopes of the Pegu Yomah.

5. *A. CRASSINERVIA*, Kurz in Hf. Ind. Fl. I. 556.—(*Cupania* sp. Wall. Cat. 8067. B).

HAB. Tenasserim (Helf. 1038).

6. *A. GRIFFITHII* (*A. minutiflora*,  $\beta$ . *Griffithii*, Hiern in Hf. Ind. Fl. 557; *Euphoria exstipulata*, Griff. Not. Dicot. 547.

HAB. Tenasserim (Helf. 1039); Mergui (Griff.).

7. *A. OLIGOPHYLLA*, Miq. Suppl. Fl. Sum. 507 and Ann. Mus. Lugd. Bat. IV. 41.—(*Meliacea Singapureana*, Wall. Cat. 4887).





HAB. Tenasserim (Helf. 1046).

I have only fragments of the Wallichian plant, which so far agree.

*A. Roxburghiana*, as understood by Mr. Hiern, is a heterogeneous assemblage which, besides the above, includes also the Khasyan *A. undulata*, Miq. Ann. Mus. Lugd. Bat. IV. 44 (= *Milnea* sp. 17. Hf. and Th., referred by Hiern to *A. edulis*).

*Amoora*, Roxb.

*Conspectus of species.*

\* Petals 3. Anthers 6—8.

× Flowers sessile, spiked, the male spikes forming large panicles.

Leaflets shortly acuminate; fertile spikes simple, many-flowered; male flowers about 4 lin. in diameter, the staminal tube entire at the apex, ..... *A. Rohituka*.

× × Flowers pedicelled, cymose or racemose-cymose and panicle.

\* O Male panicles ample, as long to half as long as the leaves.

Leaflets shortly acuminate, thin coriaceous, the nerves prominent on both sides, the veins and net-venation distinct, ..... *A. spectabilis*.

Leaflets blunt, smaller, coriaceous, the nerves above hardly visible and impressed, the veins and net-venation obsolete; fertile spikes few-flowered; flowers about 2 lin. in diameter, the staminal tube slightly 3-toothed, ..... *A. cucullata*.

O O Panicles slender, shorter or as long as the petiole.

Leaflets green, conspicuously nerved and net-veined on both sides; flowers long pedicelled; panicle very lax, densely lepidote, ..... *A. lactescens*.

\* \* Petals 5. Stamens 10.

Panicles shorter than the petiole, like the petiole densely lepidote; leaves sparingly lepidote beneath, ..... *A. dysoxyloides*.

1. *A. ROHITUCA*, WA. Prodr. I. 119; Bedd. Fl. Sylv. t. 132; Hf. Ind. Fl. I. 559.—(*Andersonia Rohituka*, Roxb. Fl. Ind. II. 213; Griff. Not. Dicot. 507. t. 589. f. 3).

HAB. Frequent in the tropical forests of the eastern slopes of the Pegu Yomah, and from Martaban down to Tenasserim, up to 3000 feet elevation.—Fl. Apr. May.

2. *A. SPECTABILIS*, Miq. Ann. Mus. Lugd. Bat. IV. 37; Hf. Ind. Fl. I. 561.

HAB. Rangoon (*teste* Hiern).

I have seen no Burmese specimens; the original Wallichian tree came from Assam (Gwálpára) and not from Nepal.

3. *A. CUCULLATA*, Roxb. Corom. Pl. III. 54. t. 258; Hf. and Ind. Fl. I. 560. (*Andersonia cucullata*, Roxb. Fl. Ind. III. 212).

HAB. Forests of Lower Pegu and Tenasserim.—Fl. Sept.

4. *A. LACTESCENS*, Kurz MS.

HAB. Rather rare in the tropical forests of Martaban, east of Toungoo (Hb. Kz. 1381).

5. *A. DYSOXYLOIDES*, Kurz MS.

HAB. Martaban, Yoonzeleen, at 900 feet elevation (Brandis).



## Walsura, Roxb.

*Conspectus of genera.*

*Subg. 1. EUWALSURA.* Berries indehiscent or only very slowly and incompletely dehiscing along the sutures, usually velvety or tomentose.

\* *Panicles densely pubescent.* Young shoots and petioles of young leaves puberulous.

Petals pubescent; filaments flat, at the very broad base somewhat coherent,

.. *W. trichostemon.*

\* \* *Panicles minutely puberulous; leaves and petioles glabrous.*

O Leaves coriaceous or firmly chartaceous.

Leaves beneath usually white-areolate within the net-venation; filaments broadly lanceolate, sprinkled with minute hairs, ..... *W. robusta.*

Leaflets uniformly glaucous beneath; filaments linear, densely pubescent; flowers larger, ..... *W. hypoleuca.*

O O Leaves thin chartaceous or almost membranous, the net-venation very thin and inconspicuous.

Leaves acuminate, uniformly glaucous beneath; young fruits acuminate, greyish velvety, ..... *W. oxycarpa.*

*Subg. 2. HEYNEA, Roxb.* Berries dehiscing along the sutures, usually glabrous.

Glabrous or pubescent; leaflets in 3—6 pairs; panicles long-peduncled, .... *W. trijuga.*

1. *W. TRICHOSTEMON*, Miq. in Ann. Mus. Lugd. Bat. IV. 60.—(*W. villosa*, WA. Prod. I. 120. in adn., nomen nudum; Hf. Ind. Fl. I. 564.)

HAB. Frequent in the eng and low forests from Pegu and Martaban down to Tenasserim; also Ava.—Fl. March, Apr.; Fr. May, June.

N. B.—Wall. Cat. 8113 from Sylhet, which, according to Hiern, differs from the known species of *Walsura*, is *W. tubulata*, Hiern.

2. *W. ROBUSTA*, Roxb. Fl. Ind. II. 386; Hf. Ind. Fl. I. 565.

HAB. Rather rare in the tropical forests of the eastern slopes of the Pegu Yomah, but frequent in those of Martaban down to Tenasserim and the Andamans.—Fl. May; Fr. July.

3. *W. HYPOLEUCA*, Kurz in Journ. As. Soc. Beng. 1872. 296 excl. fruct.; Hf. Ind. Fl. I. 564.

HAB. Frequent in the tropical forests of the Andamans.—Fl. May, June.

4. *W. OXYCARPA*, Kurz MS.

HAB. Not unfrequent in the tropical forests of the Andamans.

5. *W. TRIJUGA* (*Heynea trijuga*, Roxb. Corom. Pl. III. 56. t. 260. and Fl. Ind. II. 390; Bot. Mag. t. 1738; Hf. Ind. Fl. I. 565.—(*Heynea quinquejuga*, Roxb. Fl. Ind. II. 391).

VAR. *a. GENUINA*, all parts (also the panicle) quite glabrous, or only the young shoots slightly pubescent; leaflets in 3 to 6 pairs.

VAR. *β. PUBESCENS*, (*Walsura pubescens*, Kurz in Journ. As. Soc. Beng. 1872. 397), all softer parts, inflorescence, and under surface of leaves, softly pubescent; leaflets usually in 4 pairs.





HAB. Var.  $\alpha$ . Upper Tenasserim ; var.  $\beta$ . rather rare in the tropical forests along the eastern slopes of the Pegu Yomah, and in the Martaban hills, up to 2000 feet elevation.—Fl. Febr. March ; Fr. Apr.

### Carapa, Aubl.

#### *Conspectus of species.*

Leaflets more or less ovate ; flowers 5-merous, about 2 lin. across, ..... *C. Moluccensis*.  
Leaflets obovate to obovate-oblong ; flowers 4-merous, about 4 lin. across, .. *C. obovata*.

1. *C. MOLUCCENSIS*, Lam. Encycl. Meth. I. 621 ; DC. Prod. I. 626. (*Granatum littoreum*, Rumph. Herb. Amb. t. 61. ; *Xylocarpus Granatum*, Koen. Naturf. XX. 2 ; A. Juss. in Mém. Mus. XIX. 244 ; Miq. Ann. Mus. Lugd. Bat.).

HAB. Not unfrequent along the rocky and sandy shores of the Andamans, especially along the western side.—Fr. Apr. May.

2. *C. OBOVATA*, Bl. Bydr. 179. (*Xylocarpus obovatus*, A. Juss. in Mém. Mus. XIX. 344 ; Miq. in Ann. Mus. Lugd. Bat. IV. 62 ; *Xylocarpus Granatum*, Roxb. Fl. Ind. II. 240 ; *Monosoma littorata*, Griff. Not. Dicot. 502. t. 588. f. 3. ; *Guarea oblongifolia*, Griff. Not. Dicot. 503 ?).

HAB. Frequent in the littoral forests, especially the tidal ones, all along the shores, from Chittagong down to Tenasserim and the Andamans.—Fl. June, July ; Fr. Apr. May.

### Chickrassia, A. Juss.

1. *Ch. TABULARIS*, A. Juss. in Mém. Mus. XIX. 251. t. 22. f. 27 ; Wight Ill. t. 56 ; Bedd. Fl. Sylv. t. 9 ; Hf. Ind. Fl. I. 568.—(*Swietenia Chickrassa*, Roxb. Fl. Ind. II. 399).

Var.  $\alpha$ . *GENUINA*, leaves and panicles glabrous ; capsules greyish, wrinkled-rough.

Var.  $\beta$ . *VELUTINA* (*Chickrassia velutina*, Roem. Syn. monog. I. 135 ; Kurz in Journ. As. Soc. Beng. 1873. 65), all softer parts, as well as the panicle, softly pubescent ; capsules black, almost smooth.

HAB. Var.  $\alpha$ . Rather rare in the tropical forests of Chittagong and Pegu down to Tenasserim ; also Andamans ; var.  $\beta$ . frequent in the dry forests of Prome and Pegu, here entering also the upper mixed forests.—Fl. Sept.

### Soymida, A. Juss.

1. *S. FEBRIFUGA*, A. Juss. in Mém. Mus. XIX. 251. t. 22. f. 26 ; Bedd. Fl. Sylv. t. 8 ; Hf. Ind. Fl. I. 567.—(*Swietenia febrifuga*, Roxb. Corom. Pl. I. t. 17. and Fl. Ind. II. 398).

HAB. Burmah (in Hb. Brandis, without locality, probably Prome).—Fl. March, Apr. ; Fr. Jul. Aug.



**Cedrela, L.***Conspectus of species.*

- \* Seeds winged at both ends. Leaflets entire.

Calyx minute, the sepals rounded, hardly  $\frac{1}{2}$  lin. long; leaflets usually on long slender petiolules, ..... *C. Toona*.

Calyx large, the sepals  $1\frac{1}{2}$  lin. long, rather acute; leaflets usually shortly petioluled, .. *C. multijuga*.

- \* \* Seeds winged only below.

Leaflets serrate or serrulate; calyx minute, ..... *C. serrata*.

1. *C. TOONA*, Roxb. Corom. Pl. III. t. 238 and Fl. Ind. I. 635; Wight. Icon. t. 161; Brand. Fl. Sylv. 72. t. 14, Bedd. Fl. Sylv. t. 10; WA. Prod. I. 124.—(*C. febrifuga*, Bl. Bydr. 180; Miq. in Ann. Mus. Lugd. Bat. IV. 63; *C. Teysmanni*, Hort. Bog. 133; Miq. l. c.).

HAB. Rather rare in the tropical forests of the Pegu Yomah, frequent in those of Martaban; also Chittagong and Arracan.—Fl. March, Apr.; Fr. Oct. Nov.

2. *C. MULTIJUGA*, Kurz in Journ. As. Soc. Beng. 1872. 297.

HAB. Rather rare in the tropical forests of the eastern slopes of the Pegu Yomah, west of Tounghoo.—Fl. March.

3. *C. SERRATA*, Royle. Ill. Him. Pl. 144. t. 25.—(*C. serrulata*, Miq. Suppl. Fl. Sum. 508 and Ann. Mus. Lugd. Bat. IV. 64; *C. longifolia*, Wall. Cat. 1273).

HAB. Ava.

The identification of *C. serrulata*, Miq. (which is the same as Wallich's plant) with *C. serrata*, Royle, is open to future inquiry.

**CHAILLETIACEÆ.****Chailletia, DC.***Conspectus of species.*

- x Nerves and net-venation beneath more or less conspicuous.

Cymes cluster-like and almost sessile; leaves green, cuneately narrowed into a very short petiole, ..... *Ch. gelonioides*.

Cymes spreading, peduncled?; leaves dark-brown in a dried state, .... *Ch. macropetala*.

- x x Nerves and net-venation beneath very faint and almost impressed.

Cymes on a peduncle 2—3 lin. long; leaves brown in a dried state, shortly petioled, .. *Ch. Helferiana*.

1. *CH. GELONIOIDES*, Bth. and Hf. Gen. pl. I. 341. and Hf. Ind. Fl. I. 570 excl. syn. Miq. (*Moacurra gelonioides*, Roxb. Fl. Ind. II. 70; DC. Prod. XV/2. 227).

HAB. Chittagong.

N. B.—*Ch. Sumatrana*, Miq. has fruits only one-third or one-fourth the size of those of *Ch. gelonioides*, not to mention other points of difference.





2. *CH. MACROPETALA*, Turcz. in Bull. Mosc. 1863. 611. (*longipetala*) ; Hf. Ind. Fl. I. 571.

HAB. Tenasserim, Mergui.

3. *CH. HELPERIANA*, Kurz in Journ. As. Soc. Beng. 1872. 297 ; Hf. Ind. Fl. I. 570.

HAB. Tenasserim, Tavoy, Moulmein, etc.

### OLACINEÆ.

#### *Conspectus of species.*

*Subord. I. OLACEÆ.* Stamens as many or twice as many (rarely fewer) as petals and *opposite to them*.

*Trib. I. EU-OLACEÆ.* Stamens anisomerous, or isomerous. Ovary 2—5-celled at the base, 1-celled at the apex or completely 1-celled, the placenta central with 2—5 pendulous ovules.

\* Stamens twice as many as petals, or if fewer, accompanied by staminodes.

*XIMENIA.* Calyx not enlarging after flowering. Stamens all perfect.

*OLAX.* Calyx enlarging and enclosing the fruit. Perfect stamens 3, rarely 5 ; staminodes 6 or fewer.

\* \* Stamens as many as petals. Staminodes none.

× Fruiting calyx much enlarged, adnate to the drupe.

*ERYTHROPALUM.* Ovary 1-celled. Tendril-bearing climbers with 3-nerved leaves.

*STROMBOSIA.* Ovary to near the summit 3—5-celled. Trees with penninerved leaves.

× × Calyx in fruit unchanged.

*ANACOLOSA.* Disk in fruit much enlarged, adnate to the drupe and resembling an engrossed adnate calyx. Petals almost. Ovary 1 or imperfectly 2-celled.

*Trib. II. OPILIEÆ.* Stamens isomerous. Ovary 1-celled with a single ovule. Flowers hermaphrodite.

\* *Perianth dichlamydeous, i. e. consisting of calyx and corolla.*

*CANSJERA.* Spikes axillary, without bracts. Calyx inconspicuous, shortly 4-lobed ; corolla gamopetalous. Stamens 4, alternating with as many hypogynous scales or glands.

*NATSIATOPSIS.* Spikes axillary, without conspicuous bracts. Calyx 4-lobed. Corolla gamopetalous. Stamens 4, free. Staminodes none.

*OPILIA.* Inflorescence while young conspicuously imbricate-bracted. Petals free. Filaments filiform. Staminodes 5.

\* \* *Perianth monochlamydeous.*

*LEPIONURUS.* Inflorescence while young conspicuously imbricate-bracted. Flowers 4-merous. Filaments very short, complanate.

*CHAMPERIYA.* Inflorescence with very deciduous minute bracts. Flowers 5-merous. Filaments slender, exserted.

*Subord. II. ICACINEÆ.* Stamens as many as petals and *alternating with them*.

*Trib. III. EU-ICACINEÆ.* Cotyledons small or dilated. Trees or erect shrubs.

\* Calyx minutely toothed or lobed. Petals usually glabrous.

*STEMONURUS.* Anthers pendulous. Drupe without fleshy appendage.

*AFODYTES.* Anthers attached at the back above the 2-lobed base. Ovary oblique. Drupe with a fleshy puffy sarcocarp covering only the one half of the nut.





DAPHNAPHYLLOPSIS. Anthers attached to the back. Drupe berry-like. Flowers sessile, in heads.

\* \* Calyx 5-cleft or the sepals distinct, imbricate.

GONOCARYUM. Flowers unisexual. Drupes dry, woody. Albumen many-lobed.

*Trib. IV. PHYTOCRENEÆ.* Cotyledons broadly foliaceous or thick-fleshy. Flowers dioecious. Climbers. Fruit drupaceous.

\* Stamens alternating with the petals.

× Flowers in heads.

PHYTOCHRENE. Filaments longer than the anthers. Albumen deeply lobed. Drupes villous or echinate.

× × Flowers in spikes racemes or panicles.

SARCOSTIGMA. Flowers interruptedly spiked; filaments longer than the anthers. Staminalodes none. Stigma sessile. Albumen none.

NATSLATUM. Flowers racemose. Filaments very short, alternating with 5 staminalodes. Styles 2. Albumen fleshy.

\* \* Stamens opposite to the petals.

JODES. Flowers cymose-panicled. Stamens 8, filaments very short. Stigma sessile. Albumen fleshy.

*Genus of doubtful position.*

CARDIOPTERIS. Sepals and petals imbricate. Fruit dry, winged. Milk-juiced annual twiners.

### Ximenia, L.

1. X. AMERICANA, L. sp. pl. 497; Roxb. Fl. Ind. II. 252; Lamk. Ill. t. 257. f. 1—2; Bth. Fl. Austr. I. 391; Hf. Ind. Fl. I. 574.—(*X. scandens*, Griff. Not. Dicot. 691).

HAB. Not unfrequent along the coasts of the Andamans; also Tenasserim.—Fl. March, Apr.

### Olax, L.

#### *Conspectus of species.*

× Enlarged calyx in fruit membranous, dry.

Branchlets terete, like the under-surface of the leaves and the racemes, puberulous, .. *O. scandens*.

All parts also the racemes quite glabrous; branchlets angular, ..... *O. zeylanica*.

× × Enlarged fruiting calyx coriaceous (fleshy in a fresh state).

Glabrous, the branchlets terete; flowers 4—5 lin. long, ..... *O. imbricata*.

1. O. SCANDENS, Roxb. Corom. Pl. II. t. 102. and Fl. Ind. I. 163; Hf. Ind. Fl. 575.—(*Olax obtusa*, Bl. Bydr. 131?).

HAB. Rather frequent all over Burmah, from Ava and Chittagong down to Tenasserim, in all deciduous forests, ascending also the pine forests up to 3500 ft. elevation, and occurring equally abundantly in the tidal forests.—Fl. Decb.—March.

2. O. ZEYLANICA, L. sp. pl. 49; Hf. Ind. Pl. I. 576. (*O. acuminata*, Wall. Cat. 6781; Hf. Ind. Fl. I. 576; *O. sphaerocarpa*, Griff. Not. Dicot. 689).





HAB. Ava, in woods at the Mogoung river (Griff. 797) ; Khakhyen hills (J. Anderson).—Fl. March.

3. *O. IMBRICATA*, Roxb. Fl. Ind. I. 164 ; Hf. Ind. Fl. I. 575.—(*O. Merguensis*, Mast. in Hf. Ind. Fl. I. 576).

HAB. Chittagong ; Tenasserim, from Moulmain to Mergui.—Fr. Febr.

*Doubtful species.*

1. *O. loranthiformis*, Griff. Not. Dicot. 691. t. 645. f. 5.

HAB. Moulmein, on the coast of Madamacan (Griff.).

*Erythropalum*, Bl.

1. *E. SCANDENS*, Bl. Bydr. 922 ; Hf. Ind. Fl. I. 578.—(*Decas'trophia inconspicua*, Griff. Not. Dicot 736. t. 613. f. 4. ; *E. populifolium*, Planch. in Ann. d. sc. nat. 4 ser. II. 260 ; Hf. Ind. Fl. I. 578).

HAB. Not unfrequent in the tropical forests of the eastern slopes of the Pegu Yomah, and from Martaban down to Tenasserim.—Fl. Apr.

*Strombosia*, Bl.

1. *S. JAVANICA*, Bl. Bydr. 1154, and Mus. Bot. I. 251. f. 47 ; Hf. Ind. Fl. I. 579.

HAB. Tenasserim (Helf. 818).

*Anacolosa*, Bl.

*Conspectus of species.*

Calyx and pedicels densely puberulous ; drupe scarlet, thinly velvety, .... *A. puberula*.

Calyx and slender pedicels glabrous, ..... *A. Griffithii*.

As preceding, but the fruiting pedicels very thick ; drupe an inch long, glabrous,

... *A. crassipes*.

1. *A. PUBERULA*, Kurz J. A. S. B. 1872. 297 ; Hf. Ind. Fl. I. 581.

HAB. Rather frequent in the tropical forests of the Andamans.—Fl. Febr. May ; Fr. Febr.

2. *A. GRIFFITHII*, Mast. in Hf. Ind. Fl. I. 580.

HAB. Tenasserim, Mergui (Griff. 821).

Probably only a glabrous form of the preceding ; the sepals and petals are not quite glabrous.

3. *A. CRASSIPES*, (*Stemonurus ? crassipes*, Kurz in Journ. As. Soc. Beng. 1872. 298 ; *Gomphandra ? crassipes*, Mast. in Hf. Ind. Fl. I. 587).

HAB. Rare along choungs in the tropical forests of the eastern slopes of the Pegu Yomah.—Fr. CS.

*Cansjera*, Juss.

*Conspectus of species.*

× Spikes simple.

Leaves small, oval, notched or blunt, pubescent ; spikes very short, solitary, *C. parvifolia*.

Leaves acuminate, opaque ; spikes solitary or by pairs, ..... *C. Rheedii*.





× × Spikes branched, rarely the uppermost ones almost simple.

Leaves acute, glossy above; spikes solitary, ..... *C. zizyphifolia*.

1. *C. PARVIFOLIA*, Kurz in Journ. As. Soc. Beng. 1872. 298; Hf. Ind. Fl. 583.

HAB. Tenasserim (Helf.).

2. *C. RHEEDII*, Gmel. Syst. I. 280; Wight Icon. t. 1861; DC. Prod. XIV. 519. Hf. Ind. Fl. I. 582 pp.—(*C. scandens*, Roxb. Corom. Pl. II. 1. t. 103 and Fl. Ind. I. 441).

HAB. Not unfrequent in the tropical forests of the Andamans and Tenasserim.—Fl. May.

3. *C. ZIZYPHIFOLIA*, Griff. Not. Dicot. 360. t. 537. f. 1. (*Olex? Sumatrana*, Miq. Suppl. Fl. Sum. 342).

HAB. Burmah (Griff. 823, most probably Tenasserim).

#### **Natsiatopsis, Kurz.**

1. *N. THUNBERGIEFOLIA*, Kurz. MS.

HAB. Ava, Khakhyen hills, Pensee (J. Anderson).—Fl. March.

Female flowers unknown.

#### **Opilia, Roxb.**

1. *O. AMENTACEA*, Roxb. Corom. Pl. II. 31. t. 158 and Fl. Ind. II. 87; Wight Ill. t. 40; Hf. Ind. Fl. I. 583.

HAB. Not unfrequent in the mixed dry forests of the Prome District. Fl. March; Fr. Apr. May.

#### **Lepionurus, Bl.**

1. *L. SYLVESTRIS*, Bl. Bydr. 1146; Miq. Fl. Ind. Bat. I. 784.—(*L. oblongifolius*; Mast. in Hf. Ind. Fl. I. 583; *Leptonium oblongifolium*, Griff. in Mael. Calc. Journ. IV. 236 and Not. Dicot. 368. t. 536).

HAB. Ava, Khakhyen hills (J. Anderson).—Fl. May.

#### **Champereya, Griff.**

1. *CH. GRIFFITHIANA*, Planch. (*Ch. sp.* Griff. Not. Dicot. 362. t. 537. f. 3).

HAB. Not unfrequent in the tropical forests of the Andaman islands; also Upper Tenasserim.—Fl. Febr.; Fr. Apr. May.

N. B.—Wherever *Lepionurus* may be placed, *Champereya* must accompany it.

#### **Daphniphyllopsis, Kurz.**

1. *D. CAPITATA*, (*Ilex daphniphyllodes*, Kurz in Journ. As. Soc. Beng. 1870. 72).

HAB. Not unfrequent in the damp hill-forests of Martaban, at 4000 to 6000 ft. elevation.—Fl. March.



An incompletely known genus, but its position in *Olacineæ* is certain. Inflorescence is exactly that of *Ilex sulcata*, while the leaves resemble those of *Daphniphyllum Himalayense*. It is nearest allied to *Mappia*.

### Stemonurus, Bl.

#### Conspectus of species.

× All parts glabrous.

Leaves  $2\frac{1}{2}$ —5 in. long; cymes leaf-opposite, the peduncle stiff and  $\frac{1}{2}$ —1 in. long, ..... *St. Penangianus*.

Leaves 2—3 in. long; cymes slightly puberulous, axillary and peduncled; drupes elliptically oblong, the putamen sulcate, ..... *St. Javanicus*.

× × Younger branchlets tawny tomentose; petioles, undersurface of leaves, and inflorescence puberulous or tomentose.

Cymes peduncled, leaf-opposed, ..... *St. tomentellus*.

1. ST. PENANGIANUS, Miers Contr. I. 90.—(*Gomphandra Penangiana*, Wall. Cat. 7204; Hf. Ind. Fl. I. 587).

HAB. Upper Tenasserim, Moulmein (Lobb) teste Masters.

2. ST. JAVANICUS, Bl. Bydr. 649; Miers. Contr. Bot I. 86.—(*Lasi-anthera Javanica*, Miq. Fl. Ind. Bat. I/1. 790; *Gomphandra affinis*, Mast. in Hf. Ind. Fl. I. 586).

HAB. Tenasserim.

3. ST. TOMENTELLUS, Kurz in Journ. As. Soc. Beng. 1872. 298.—(*Gomphandra tomentella*, Mast. in Hf. Ind. Fl. I. 587).

HAB. Burma, probably Tenasserim (Griff. 813).

### Apodytes, E. Mey.

1. A. ANDAMANICA, Kurz in And. Rep. App. B. 5. and Journ. As. Soc. Beng. 1872. 298; Hf. Ind. Fl. I. 588.

HAB. Frequent in the tropical forests of the Andaman Islands.—Fl. Febr. to May; Fr. May to July.

### Gonocaryum, Miq.

#### Conspectus of species.

Leaves opaque; drupes obtusely 4—3-angular, acute, ..... *G. gracile*.  
Leaves glossy; drupes terete, rounded at apex, ..... *G. Griffithianum*.

1. G. GRACILE, Miq. Suppl. Fl. Sum. 343 (1860).—(*Gonocaryum ? Wallichii*, Mast. in Hf. Ind. Fl. I. 590).

HAB. Tenasserim (Helf. 817).

The drupes in this species are obtusely angular, but the seeds being all aborted, no stress can, consequently, be laid upon this character, until perfected fruits with seeds become known.

2. G. GRIFFITHIANUM (*Platea Griffithsiana*, Miers. Contr. I. 97. t. 17; *Platea Lobbiana* Miers. l. c.; *Phlebocalymna Griffithiana*, Mast. in Hf. Ind. Fl. I. 590; *Phlebocalymna Lobbiana*, Mast. l. c.).



HAB. Frequent in marshes of the tropical and swamp forests, from Southern Pegu down to Tenasserim.—Fl. Decb. to March; Fr. R. S.

### Phytocrene, Wall.

#### Conspectus of species.

Male flower-heads usually more tawny, tomentose, on short but very thick pedunclets, numerous in very compound racemes terminating in the young state in short thick tomentose bract-like sterile axes, ..... *Ph. gigantea*.

Male flower-heads somewhat smaller and usually greyish, tomentose, on short but slender pedunclets, few (8—5), in simple short racemes terminating in long bract-like greyish-tomentose slender axes, ..... *Ph. bracteata*.

1. *PH. GIGANTEA*, Wall. Pl. As. var. III. 11. t. 216; Griff. Not. Dicot. t. 490. f. 2; Hf. Ind. Fl. I. 591.

HAB. Not unfrequent along chougns in the tropical forests of the eastern slopes of the Pegu Yomah; more frequent in Tenasserim.—Fl. Febr.

2. *PH. BRACTEATA*, Wall. Fl. As. var. III. 12; DC. Prod. XVII. 12; Hf. Ind. Fl. I. 592.

HAB. South-Tenasserim; Mergui (Griff. 830) *teste* Baillon.

The so-called bracts of the male inflorescences in this genus are, in my opinion, only the sterile end-branchings of the partial racemes.

### Sarcostigma, WA.

1. *S. WALLICHII*, Baill. in Adans. X. 282; DC. Prod. XVII. 16; Hf. Ind. Fl. I. 594.—(*S. edule*, Kurz in Journ. As. Soc. Beng. 1872. 298; Hf. Ind. Fl. I. 594.)

HAB. Frequent in the tropical forests of the Andaman islands.—Fl. Febr.; Fr. May to June.

Masters says that this species (*S. edule*) is probably only a form of *S. Kleinii*, but in this he is mistaken, for the latter differs by quite glabrous drupes and inflorescences; and he evidently confounds two species under this name. I would suggest to him to compare Maingay's No. 378 from Malaya (of which I have seen only leaves) with *S. Horsfieldii*.

### Iodes, BL.

#### Conspectus of species.

× Pedicels not woody, slender.

Leaves oblong, not cordate at the base, membranous, the petiole  $\frac{1}{2}$ — $\frac{3}{4}$  in. long; pedicels slender, about  $\frac{1}{2}$  lin. long, ..... *I. Brandisii*.

Leaves more or less oval, cordate at the base, coriaceous, the petiole 2—4 lin. long; flowers almost sessile, ..... *I. tomentella*.

× × Pedicels thick and woody.

Drupes orange, smooth, above an inch long, ..... *I. Hookeriana*.

1. *I. BRANDISII*, Kurz in Journ. As. Soc. Beng. 1872. 298; Hf. Ind. Fl. I. 596.





HAB. Tenasserim, Thoungyeen (Brandis).—Fl. March.

2. *I. TOMENTELLA*, Miq. Fl. Ind. Bat. I/1. 796.—(*I. ovalis*, Mast. in Hf. Ind. Fl. I. 696, vix. Bl.).

HAB. Upper Tenasserim, Moulmein (Falconer).—Fl. Febr.

3. *I. ? HOOKERIANA*, Baill. in Adans. X. 268; DC. Prod. XVII. 24; Hf. Ind. Fl. I. 596.—(*I. Thomsoniana*, Baill. l. c. 270; DC. l. c. 25; Hf. l. c.).

HAB. Chittagong (Hf. and Th.).

Fruits and habit of *Sarcostigma*. An examination of a single ovary already engrossed shewed me a solitary erect basal ovule.

### Cardiopteris, Wall.

1. *C. LOBATA*, Wall; ap. B. Br. Pl. Jav. Rar. 246. t. 49; Hf. Ind. Fl. I. 597.—(*C. hamulosa*, Griff. Dicot. 542. t. 598. f. 1—3; *C. Javanica*, Bl. Rumph. III. 206. t. 177. f. 1. A.).

HAB. Common in all leaf-shedding forests and deserted toungyas, from Ava and Martaban down to Tenasserim.—Fr. C. S.

### ILICINEÆ.

#### Conspectus of genera.

Subord. I. ILICEÆ. Petals present. Flowers hermaphrodite.

ILEX. Stamens 5. Ovary 4—8-celled.

Subord. II. DAPHNIPHYLLÆ. Flowers apetalous, unisexual.

DAPHNIPHYLLUM. Stamens 5—18. Ovary 2-celled.

### Ilex, L.

#### Conspectus of species.

- Male inflorescence cymose, the female flowers clustered or solitary.

Leaves elongate-cuneate-lanceolate, 2—3½ in. long, beneath very opaque and brown; sepals ciliate, ..... *I. gaultheriæfolia*.

- • Female flowers in simple or compound umbellets or cymes.

O Cymes head-like contracted and small, on a long compressed peduncle. Glabrous, or the branchlets pubescent, ..... *I. Godoyam*.

O O Cymes divaricately 2-cleft, on a rather short peduncle. Cymes once divaricately 2-cleft; leaves large, coriaceous; branchlets pale-coloured, ..... *I. macrophylla*.

Cyme twice or thrice dichotomously branched; leaves beneath pale-coloured or glaucous; branchlets pure white; style stout, distinct, ..... *I. cymosa*.

As preceding, but stigma sessile, ..... *I. Wallichii*.

1. *I. GAULTHERIÆFOLIA*, Kurz in Journ. As. Soc. Beng. 1872. 299.

HAB. Tenasserim, Mergui (Griff. 1998).

Dr. Hooker identifies this species with his *I. theaefolia*, but in this he is in error, his new species differing greatly not only in the texture and polish of the leaves, but still more so in the inflorescence, doubly



larger flowers, and very long pedicels (in my species they are only about  $\frac{1}{2}$  lin. long).

2. *I. GODAYAM*, Coleb. in. Hf. Ind. Fl. I. 604.—(*Prinos Godayam*, Ham. in Wall. Pl. As. rar. III. 38. t. 261.)

VAR.  $\alpha$ . *GENUINA*, shoots, peduncles, and pedicels shortly puberulous; calyx more or less pubescent or densely fringed.

VAR.  $\beta$ . *SULCATA*, (*I. sulcata*, Wall. Cat. 4330; Hf. Ind. Fl. I. 604), all parts quite glabrous except the puberulous pedicels; calyx usually puberulous or only minutely puberulous, the lobes sometimes ciliolate.

HAB. Var.  $\beta$ . Not unfrequent in the tropical forests from Martaban down to Tenasserim.—Fl. Febr. Apr.

3. *I. MACROPHYLLA*, Wall. Cat. 4331; Hf. Ind. Fl. I. 604.

HAB. ? Tenasserim (Helfer), and Mergui (Griff. 2012) *teste* Hf.

4. *I. CYMOSA*, Bl. Bydr. 1149; Hf. Ind. Fl. I. 605.

HAB. Tenasserim (*teste* Hf.).

5. *I. WALLICHII*, Hf. Ind. Fl. I. 605.

HAB. Tenasserim, Tavoy (*teste* Hf.).

### *Daphniphyllum*, Bl.

#### *Conspectus of species.*

Calyx persistent?; pedicels about  $\frac{1}{2}$  in. long, ..... *D. majus*.

Calyx deciduous; pedicels about 1—2 lin. long, ..... *D. Himalayense*.

1. *D. MAJUS*, Muell. Arg. in Linn. XXXIV. 76; DC. Prod. XVI/1. 2.

HAB. Upper Tenasserim, Amherst (Wall.) Fl. Febr.

2. *D. HIMALAYENSE*, Muell. Arg. in DC. Prod. XVI/1. 4.

HAB. Not unfrequent in the damp hill-forests of the Martaban hills, east of Tounghoo, at about 5000 ft. elevation.

### *CELASTRINEÆ.*

#### *Conspectus of species.*

*Subord. I. CELASTRACEÆ.* Stamens inserted outside the disk. Seeds albuminous.

• Capsule or follicle dehiscent.

× Ovules from the axis of the cells. Leaves opposite.

*EVONYMUS.* Petals free. Disk fleshy, broad; capsules 3—5-lobed and -celled.

*MICROTHOPIS.* Petals united at the base. Disk none or annular. Capsule 1-celled, 2-valved.

× × Ovules erect. Leaves alternate.

*CELASTRUS.* Ovary free. Capsules 2—4-celled, loculicidal. Seeds arillate. Flowers in panicles or racemes.

*GYMNOSPORIA.* Ovary confluent with the disk. Capsule 2—3-lobed and -celled. Arillus complete, incomplete or wanting. Flowers in cymes.





KURRIMIA. Ovary free, styles 2. Capsule entire or 2-lobed, 1—2-celled, follicle-like and slowly dehiscent into 1 or 2 valves. Flowers in cymes or racemes, or paniced.

\* \* Fruit an indehiscent drupe or berry.

ELÆODENDRON. Ovary superior, confluent with the disk; drupe containing an 1—3-celled putamen. Leaves opposite or nearly so.

SIPHONODON. Ovary half-inferior, 5-celled. Berry large, containing many pyrenes. Leaves alternate.

*Subord. II. HIPPOCRATEACEÆ.* Stamens 3, rarely 2—5, inserted within or on the disk. Albumen none. Leaves opposite.

\* Fruit an indehiscent berry, 1—many-seeded. Seeds not winged.

SALACIA. Only genus. Scandent shrubs. Inflorescences axillary. Stamens 3, rarely 2 or 4, inserted within the disk.

\* \* Fruit capsular or samaroid, dehiscent. Seeds winged.

× Ripe carpels samaroid, 2-valved. Stamens 3, inserted within the disk. Scandent shrubs.

HIPPOCRATEA. Ripe carpels usually 3. Seeds usually winged at the lower end. Inflorescences terminal or terminal and axillary.

× × Fruit a capsule. Erect trees or shrubs. Stamens 5, inserted on the disk.

LOPHOPETALUM. Capsule 3—4-celled and -lobed, loculicidal. Seeds winged all round. Not gland-dotted.

KOKOONA. Capsule 3-celled and -lobed, loculicidal. Seed winged at the upper end only. All herbaceous parts gland-dotted.

### Evonymus, L.

#### Conspectus of species.

*Subg. 1. EVONYMUS.* Ovules 2 in each cell.

\* Flowers solitary or clustered in the axils of the leaves.

Flowers nearly 5—6 lin. across; petals fringed; capsules sharply angular, on  $\frac{1}{2}$ —1 in. long peduncles; leaves glossy, entire, ..... *E. Javanicus*.

Capsules globular, obtusely lobed, very shortly peduncled or almost sessile; leaves green, opaque, ..... *E. calocarpus*.

\* \* Flowers in dichotomous cymes.

× Branchlets terete or nearly so, or somewhat compressed.

Flowers small, usually 5-merous; petals entire; capsules angular; leaves serrulate upwards, ..... *E. glaber*.

× × Branchlets sharply 4-cornered or almost winged.

Flowers small, in very slender cymes; capsules small, smooth, ..... *E. Griffithii*.

*Subg. 2. GLYPTOPETALUM.* Ovules solitary in the cells.

Bark red; petals 4, greenish purple, concave-orbicular, without grooves; capsules very rough from scurfy fissures and warts, ..... *E. sclerocarpus*.

1. *E. JAVANICUS*, Bl. Bydr. 1146; Benn. in Horsf. Pl. Jav. var. 130. t. 28; Hf. Ind. Fl. I. 607.—(*E. Bancanus*, Miq. Suppl. Fl. Sum. 513).

HAB. Tropical forests of Tenasserim, from Moulmein southwards.—

Fl. March.

2. *E. CALOCARPUS*, Kurz in Journ. As. Soc. Beng. 1872. 299; Hf. Ind. Fl. I. 609.



HAB. Tenasserim (Helfer 1973).

3. *E. GLABER*, Roxb. Fl. Ind. I. 628; Hf. Ind. Fl. I. 609.—(*E. garcinoides*, Roxb. HBC.; *E. Timorensis*, Laws. in Hf. Ind. Fl. I. 610, non Zipp.).

HAB. Not unfrequent in the tropical forests of Martaban and Tenasserim, rare in those of the eastern slopes of the Pegu Yomah; also Chittagong.—Fl. March, Apr.

4. *E. GRIFFITHII*, Kurz in Journ. As. Soc. Beng. 1872, 73; Ind. Fl. I. 611.—(*Hippocratea angulata*, Griff. Not. Dicot. 473. t. 581. f. 1).

VAR.  $\alpha$ . *GENUINA*, petioles thick, hardly  $\frac{1}{4}$  lin. long or the leaves almost sessile and obsoletely serrate.

VAR.  $\beta$ . *DUBIA*, petioles slender, 2—3 lin. long; leaves entire or nearly so.

HAB. Var.  $\alpha$ . Ava, on rocks at Loonkarim and Delvi-Nempean on the North from Assam (Griff. 1977); var.  $\beta$ . not unfrequent in the damp hill-forests of the Nattoung ranges in Martaban, east of Youngoo, at 6000—7000 ft. elevation.—Fl. Apr. ?

VAR.  $\beta$ . will prove a distinct species, but as my specimens are in very young bud only, I am unwilling to establish the species until better material comes to hand.

5. *E. SCLEROCARPUS*, Kurz in Journ. As. Soc. Beng. 1872. 299.—(*Glyptopetalum sclerocarpum*, Laws. in Hf. Ind. Fl. I. 613).

HAB. Rather rare in the tropical forests around the Kambala toung of the central Pegu Yomah.—Fl. Fr. Febr.

### **Microtropis, Wall.**

#### *Conspectus of species.*

\* Cymes not much longer than the petiole, robust and crowdedly-flowered.

Leaves coriaceous, smooth; capsules  $\frac{1}{2}$  in. long, grey, ..... *M. garcinifolia*,

\* \* Cymes much longer than the petiole, lax and dichotomously branched.

Leaves smooth, glossy above; peduncle slender, 1—1 $\frac{1}{2}$  in. long, ..... *M. bivalvis*.

Leaves coriaceous, wrinkled especially above, opaque; peduncle  $\frac{1}{2}$ — $\frac{3}{4}$  in. long,  
..... *M. longifolia*.

1. *M. GARCINIFOLIA*, Wall. ap. Wight Icon. t. 761.—(*Evonymus garcinifolius*, Roxb. Fl. Ind. I. 628; *M. discolor*, Wall. Cat. 4337: Hf. Ind. Fl. I. 614).

HAB. Rather frequent in the damp hill-forests of Martaban and Tenasserim, at 5000 to 7000 ft. elevation.—Fl. March.

2. *M. BIVALVIS*, Wall Cat. 4340; Hf. Ind. Fl. I. 614.—(*Celastrus bivalvis*, Jack.; Roxb. Fl. Ind. ed. 1. II. 399).

HAB. Tropical forests of Tenasserim, from Moulmein southwards.—Fl. Febr. and Sept.; Fr. Octob.

3. *M. LONGIFOLIA*, Wall. in Journ. As. Soc. Beng. 1873. 65.





HAB. Tenasserim, from Moulmein District (Dr. Brandis) down to Tavoy (Wall).—Fr. Octob.

The specimens in Brandis' herbarium have smaller and more obtuse leaves.

### **Celastrus, L.**

#### *Conspectus of species.*

Panicles slender, terminal; capsules 3-celled with 3—6 seeds, ..... *C. paniculatus*.  
Cymes robust, forming usually axillary and terminal spurious panicles; capsule 1-celled and 1-seeded, ..... *C. monosperma*.

1. *C. PANICULATA*, Willd. sp. pl. I. 1125; Roxb. Fl. Ind. I. 621; Wight Ill. t. 72 and Icon. t. 158; Hf. Ind. Fl. I. 617.—(*C. multiflora*, Roxb. Fl. Ind. I. 622; *C. nutans*, Roxb. l. c. 623).

VAR. *α*. *GENUINA*, all parts quite glabrous or nearly so.

VAR. *β*. *PUBESCENS*, (*C. pubescens*, Wall. Cat. 4303), leaves beneath and the petioles pubescent; panicles densely puberulous.

HAB. Not unfrequent in the leaf-shedding forests all over Pegu, especially in the drier parts; var. *β*. Pegu, Prome hills.—Fl. HS.; Fr. Sept. Octob.

2. *C. MONOSPERMA*, Roxb. Fl. Ind. I. 625; Hf. Ind. Fl. I. 618.

HAB. Ava, Khakhyen hills, Ponsee (J. Anderson).—Fr. March.

Lawson doubtfully gives Pegu as a locality for *C. stylosa*, Wall., but this is very probably a mistake.

### **Gymnosporia, WA.**

#### *Conspectus of species.*

Unarmed; leaves oblong-lanceolate to lanceolate, finely acuminate, ..... *G. acuminata*.  
Unarmed; leaves obversely lanceolate, ..... *G. oblanceolata*.  
Armed, the spines leaf- and flower-bearing; leaves obovate, blunt to almost notched, .. *G. montana*.

1. *G. ACUMINATA*, Hf. Ind. Fl. I. 619.

HAB. Ava, Khakhyen hills.—Fl. Apr.

2. *G. OBLANCEOLATA*, Laws. in Hf. Ind. Fl. I. 619.

HAB. Burmah (Griff.) teste Lawson.

Barely recognisable by the meagre description given.

3. *G. MONTANA*, Laws. in Hf. Ind. Fl. I. 621 excl. syn. Lamk.—

(*Celastrus montanus*, Roxb. Fl. Ind. I. 620; Wight Icon. t. 382).

HAB. Pegu, without locality (Dr. Brandis), probably Prome?

### **Kurrimia, Wall.**

1. *K. ROBUSTA*, Kurz in Journ. As. Soc. Beng. 1870. 73. (*Celastrus robustus*, Roxb. Fl. Ind. I. 626; *K. pulcherrima*, Wall. Cat. 4334, *nomen nudum*; Hf. Ind. Fl. I. 622).





HAB. Rare in the tropical forests along the eastern slopes of the Pegu Yomah, but frequent in those of Martaban and Tenasserim; also Chittagong.—Fl. Febr.; Fr. Apr. Aug.

### Siphonodon, Griff.

1. *S. CELASTRINUS*, Griff. in Mael. Calc. Journ. IV. 247. t. 14; Hf. in Linn. Trans. XXII. t. 26; Hf. Ind. Fl. I. 629.

HAB. Frequent in the tropical forests of the eastern slopes of the Pegu Yomah and of Martaban.—Fl. Jan. to May.

### Salacia, L.

#### Conspectus of species.

- \* *Cymes peduncled and dichotomously branched, usually short.*
  - Branches terete; pedicels thick, 6—8 lin. long; sepals not ciliate; filaments very short, complanate and reflexed, ..... *S. longifolia*.
  - Cymes 4 in. long! divaricate, ..... *S. Griffithii*.
  - Branches marked by decurrent lines and more or less angular; pedicels about 4 lin. long, slender, arising from the globose rusty-bracteolled ends of the cyme-branches; sepals fringed; filaments nearly  $\frac{1}{2}$  lin. long, terete and erect, ..... *S. tortuosa*.
  - \* \* *Flowers springing from an axillary sessile tubercle or wart.*
    - × Flowers large; petals about 3—4 lin. long.
    - Pedicels 2—3 lin. thick; leaves large, coriaceous, ..... *S. grandiflora*.
    - × × Flowers minute or small, the petals less than 2 lines long.
    - † Leaves turning brown or dark-coloured in drying. Filaments very short and complanate.
    - Branchlets dark-brown, corky-lenticellate; leaves entire; sepals ciliate; ovary cells 2-ovuled, ..... *S. verrucosa*.
    - Branchlets pale-coloured, sparingly lenticellate; leaves serrate; berries as large as a crab-apple, 2—3-seeded; sepals not ciliate, ..... *S. Roxburghii*.
    - † † Leaves turning yellowish or pale green in drying.
    - O Petals clawed; filaments terete, slender.
    - Petals about a line long, clawed; pedicels as long or longer than the petiole; berries 1-seeded, ..... *S. prinoides*.
    - O O Petals sessile; filaments very short and dilated.
    - Pedicels few, short, 1—1½ lin. long, ..... *S. flavescens*.
    - Pedicels numerous, slender, longer than the petiole, ..... *S. multiflora*.

1. *S. LONGIFOLIA*, Wall. Pl. As. rar. III. 1832. 47. t. 278, non Hf. cujus homonymum in *S. Maingayanam* est mutandum.—(*S. floribunda*, Wight Ill. 1840. I. 134; Hf. Ind. Fl. I. 629).

HAB. Tenasserim, Mergui (Griff. 885/1); Moulmein District (Falconer).—Fr. Jan.

N. B.—Lawson has a *S. Griffithii* (Hf. Ind. Fl. I. 628) to which he ascribes divaricate cymes 4 in. long, but his brief phrase does not enable me to form an idea of the plant. Can it be *S. diandra*, Miq.?

2. *S. TORTUOSA*, Griff. Not Dicot. 471. t. 581. f. 2.





HAB. Tenasserim, from Moulmein District down to Mergui (Griff. 899).—Fl. Jan. to March.

3. *S. GRANDIFLORA*, Kurz in Journ. As. Soc. Beng. 1872. 300; Hf. Ind. Fl. I. 626.

HAB. Tenasserim (Helf. 898).

4. *S. VERRUCOSA*, Wight Ill. I. 1840. 134; Hf. Ind. Fl. I. 628.—(*S. polyantha*, Korth. Verh. Naturk. Gesch. Bot. 1839—42. 182; *S. sp.* Griff. Not. Dicot. 471).

HAB. Frequent in the tropical forests, from Martaban, east of Tounghoo, down to Tenasserim as far as Mergui (Griff. 888).—Fl. Jan. to March; Fr. Apr.

5. *S. ROXBURGHII*, Wall. Cat. 4217; Hf. Ind. Fl. I. 627.—(*Johnia salacioides*, Roxb. Fl. Ind. I. 168; *S. membranacea*, Laws. in Hf. Ind. Fl. I. 627).

HAB. Tropical forests of Tenasserim (Helf. 896).

Lawson gives Mergui, Moulmein, and the Andamans as localities for *S. viminea*, Wall. Cat. 7267, while he omits Penang and Malacca (Griff. 900), the original localities. Without seeing Burmese specimens I hesitate to adopt the species as Burmese.

7. *S. PRINOIDES*, DC. Prod. I. 571; Griff. Not. Dicot. 470; Wight Icon. t. 321; Hf. Ind. Fl. I. 626.—(*Johnia Coromandeliana*, Roxb. Fl. Ind. I. 169; *S. latifolia*, Wall. Cat. 4222; Hf. Ind. Fl. I. 629. pp.)

HAB. Frequent in the tidal forests, all along the coast, from Chittagong and Pegu down to Tenasserim and the Andamans.—Fl. Jan.; Fr. March to June.

This is one of those species that grow under the influence of the sea as well as in the interior of India, where it recurs in the stony drier tracts.

8. *S. FLAVESCENS*, Kurz in Journ. As. Soc. Beng. 1872. 300; Hf. Ind. Fl. I. 625.

HAB. Tenasserim (Helf. 897); Tavoy.

9. *S. MULTIFLORA*, Wight Ill. I. 134; Hf. Ind. Fl. I. 627.—(*S. myrtifolia*, Griff. Not. Dicot. 470?)

HAB. Tenasserim, Mergui (Griff.).

I have not seen this species.

### Hippocratea, L.

#### Conspectus of species.

× Petals  $\frac{1}{2}$ —1 lin. long, imbricated in the bud.

Petals about  $\frac{1}{2}$  lin. long; leaves glaucous, ..... *H. Indica*.

Petals about a line long; leaves turning brown in drying, ..... *H. fuscus*.

× × Petals about 2 lin. long, valvate in the bud.

Flowers outside and inflorescence greyish puberous; carpels linear-oblong, 2—3 $\frac{1}{2}$  in. long, ..... *H. macrantha*.

Petals inside densely greyish hairy, ..... *H. Lobbi*.



1. *H. INDICA*, Willd. sp. pl. I. 193; Roxb. Corom. Pl. II. t. 130 and Fl. Ind. I. 165; Hf. Ind. Fl. I. 624.

HAB. Rather rare in the open forests of Martaban, east of Tounghoo; Tenasserim.—Fl. Apr.

2. *H. FUSCESCENS*, Kurz in Journ. As. Soc. Beng. 1872. 300.

HAB. Upper Tenasserim, near Moulmein (Falconer).

3. *H. MACRANTHA*, Korth. Verh. Naturk. Gesch. Bot. 187. t. 39; Miq. Fl. Ind. Bat. I/2. 599 and Ann. Mus. Lugd. Bat. IV. 153.—(*H. grandiflora*, Wall. Cat. 4213).

HAB. Tenasserim (Helf. 905).

The disk both in the Tenasserim and the Khási hill plant is quite glabrous. The species differs from *H. obtusifolia* greatly in the size and shape of the ripe carpels.

4. *H. LOBBII*, Laws. in Hf. Ind. Fl. I. 624.

HAB. Tenasserim, Moulmain (*teste* Lawson).

### Lophopetalum, Wight.

#### Conspectus of species.

\* *Petals fringedly crested or lamellate on the upperside. Disk 5-lobed.*

Flowers nearly  $\frac{1}{2}$  in. in diameter; crest of petals fringed, ..... *L. fimbriatum*.

\* \* *Petals naked, in a dried state often turning wrinkled or corrugate on the inner face.*

× Panicles glabrous. Disk smooth, in a dried state often conspicuously wrinkled. Leaves elliptical to ovate.

Panicles brachiate, stiff and squarrose; flowers about 3 lin. in diameter; disk wrinkled, ..... *L. Wallichii*.

As preceding but panicles larger and slenderly branched; flowers about 2 lin. across; disk wrinkled, ..... *L. littorale*.

Apparently the same as the preceding, but the disk said to be entirely covered with "lobulate warts," ..... *L. celastroides*.

× × Panicles while young covered with a rusty coloured or greyish tomentum.

Leaves lanceolate to oblong-lanceolate; petiole 3—4 lin. long; flowers about 1—1½ lin. across; disk smooth or nearly so, ..... *L. floribundum*.

1. *L. FIMBRIATUM*, Wight Ill. I. 178; Hf. Ind. Fl. I. 615.

HAB. Lower Pegu, Pongleem (Dr. Brandis), and Martaban (Yoonzeleen, &c.) down to Tenasserim, Mergui (Griff.).—Fl. March.

2. *L. WALLICHII*, Kurz in Journ. As. Soc. Beng. 1872. 299; Hf. Ind. Fl. I. 615.

HAB. Common in the open, more especially in the eng-forests, all over Pegu and Martaban down to Tenasserim.—Fl. Jan. March; Fr. March, Apr.

3. *L. LITTORALE*, (*Kokoona littoralis*, Laws. in Hf. Ind. Fl. I. 617).

HAB. In inundated low lands of the Pazwoondoung river of Pegu;





in Upper Tenasserim apparently frequent.—Fl. Febr. March ; Fr. March, Apr.

Very close to the preceding, but differing by its smaller flowers and in the slenderness of the peduncles and pedicels, as also in its growth in lowlands inundated during rains. Lawson ascribes sublamellate petals to this species, while they are simply longitudinally corrugate in the Burmese specimens, and hence I suspect that he has made up his phrasule (for a description it cannot be called) from Malayan specimens, quite overlooking the fact that Wallich's No. 6520 all came from Burma. He also still ascribes to the genus *Lophopetalum* "rarely winged, arillate seeds" and a "fleshy albumen," all characters which are applicable to the genus if taken in the absolute negative. Wight erroneously included the *Evonymus grandiflorus* in *Lophopetalum* and drew the characters of the seeds from it: whence the confusion which I have already pointed out in Journ. As. Soc. Beng. 1870, p. 73. On account of the dotted vegetative parts and the seeds being winged at the upper end only, I now prefer keeping up the genus *Kokoona* Thw. Lawson has also a *L. celastroides* from Upper Tenasserim and Pegu, the description of which does not enlighten one much as to the characters wherein it differs from the above otherwise than by the lobulate warts of the dried disk.

4. *L. FLORIBUNDUM*, Wight Ill. I. 178 ; Hf. Ind. Fl. I. 616.—(*Hippocratea pentandra*, Griff. Not. Dicot. 472).

HAB. Tenasserim, Mergui, in dense forests and along the coast of the island Madamaca (Griff. 1977/2).—Fl. Decb.

#### *Doubtful species.*

1. *L. FILIFORME*, Laws. in Hf. Ind. Fl. I. 616.

HAB. Tenasserim, Mergui (Griff.) *teste* Lawson.

Not seen by me, but hardly belongs to this genus. The cupular disk points to *Hippocratea*, but the number of stamens is not given.

### *RHAMNACEÆ.*

#### *Conspectus of genera.*

*Trib. I. ZIZYPHÆÆ.* Drupe containing a solid 1—3-celled putamen, or the fruit a capsule or indehiscent nut. Ovary superior or half-superior. Disk filling the calyx-tube.

- \* Ovary half-superior or superior. Fruit a nut, dry, coriaceous, 1-celled and 1-seeded, or a capsule. (*Ventilagineæ*).

*VENTILAGO.* Nut produced into a long terminal wing, indehiscent.

*SMYTHEA.* Capsule lanceolate or urn-shaped, 2-valved.

- \* \* Ovary superior. Drupe fleshy or dry, with an 1—3-celled hard putamen. (*Zizyphææ genuinæ*).

*ZIZYPHUS.* Leaves palmately 3—5-nerved.





BERCHEMIA. Leaves penninerved.

Trib. II. RHAMNEÆ. Fruit dry or drupaceous, containing 3 (rarely 2—4) indehiscent or 2-valved cocci. Ovary superior to inferior.

\* Ovary superior or half-superior. Drupe fleshy or dry, superior. Disk fleshy, filling the calyx-tube. (*Rhamnea vera*).

SAGERETIA. Flowers in terminal panicles. Leaves opposite or nearly so.

SCUTIA. Flowers in fascicles or umbellules. Leaves opposite or nearly so.

COLUMBINA. Flowers in cymes. Leaves alternate.

\* \* Ovary and fruit inferior, the latter crowned by the calyx-limb. (*Gouania*).

APTERON. Styles 2. Fruit globose, not winged. Flowers clustered, in terminal panicles.

GOUANIA. Fruit dry, 3-cornered or -winged. Flowers spicate or racemose, panicled.

### Ventilago, Gaertn.

#### Conspectus of species.

× Calyx adnate to the drupe, small and basilar.

Flowers in slender simple or branched racemes; not indistinctly puberous, the wing only 1—1½ in. long. .... *V. Madraspatana*.

× × Calyx adnate to the drupe for ¼—½ of its length, and forming there a prominent ring.

O Flowers and fruit more or less yellowish pubescent or tomentose.

Racemose panicles and flowers tomentose; fruits puberulous, the wing 1½—1 in. long, the calyx reaching the middle of the nut, .... *V. calyculata*.

O O Fruits quite glabrous, even when young.

All parts glabrous; nuts about 3 lin. in diameter, the calyx reaching the middle and forming a sharp ring there, the wing rounded at the apex, .... *V. leiocarpa*.

Glabrous?; nuts nearly ½ in. across, the calyx broad and flat, occupying only the basal part of the nut, the wing shortly acuminate, .... *V. Maingayi*.

1. *V. MADRASPATANA*, Gaertn. Fruct. I. 223. t. 29; Wight Icon. t. 514; Bth. in Linn. Proc. v. 76; Hf. Ind. Fl. I. 631.

HAB. Tenasserim, Moulmein to Mergui (Griff. etc.) teste Bth.

2. *V. CALYCULATA*, Tul. in Ann. d. sc. nat. 4 ser. VIII. 124; Bth. in Linn. Proc. V. 76; Hf. Ind. Fl. I. 631, excl. syn. *V. macrantha*.—(*Ventilago Maderaspatana*, Roxb. Corom. Pl. I. 55. t. 76 and Fl. Ind. I. 629, non Gaertn.).

HAB. Not unfrequent in the open, especially the eng-forests, and in the dry forests of Prome, Pegu, and Martaban; also Ava; Tenasserim, teste Lawson.—Fl. Nov.; Fr. March, Apr.

3. *V. LEIOCARPA*, Bth. in Linn. Proc. V. 77; Hf. Ind. Fl. I. 631.

HAB. Tenasserim.

4. *V. MAINGAYI*, Laws. in Hf. Ind. Fl. I. 631. (*V. sp.* Griff. Not. Dicot. 492).

HAB. Tenasserim (Helf.); Mergui (Griff.) teste Lawson.



**Smythea**, Seem.

1. *S. CALPICARPA*, Kurz in Journ. As. Soc. Beng. 1872. 301; Hf. in Ind. Fl. I. 632.

HAB. Tenasserim (Helf. 2026/1).

**Zizyphus**, Juss.*Conspectus of species.*

\* Flowers in axillary cymes or clusters.

O Leaves more or less tomentose or pubescent beneath. Drupes sappy, quite glabrous.

Leaves coriaceous, densely fulvous or whitish tomentose beneath, glabrous above; drupe

$\frac{1}{2}$ — $\frac{3}{4}$  in. long, the putamen 2-celled; erect shrub or tree, ..... *Z. jujuba*.

Leaves membranous, above thinly beneath densely silky pubescent; drupe the size of a pea, the putamen 1- rarely 2-celled; erect or scandent shrub, ..... *Z. oenoplia*.

O O Leaves glabrous or sprinkled with a few hairs on the nerves beneath.

Leaves green, thin chartaceous; drupes while young tawny tomentose, adult woody, ..... *Z. glabra*.

\* \* Cymes collected into leafy or leafless panicles. Drupes woody.

Leaves glabrous, rigidly chartaceous; drupes glabrous; climber, ..... *Z. funiculosa*.

Leaves densely fulvous tomentose or pubescent beneath; drupes glabrous; leaf-shedding tree, ..... *Z. rugosa*.

1. *Z. JUJUBA*, Lamk. Exc. Meth. III. 318; Wight Icon. t. 99; Roxb. Fl. Ind. I. 608; Griff. Not. Dicot. 491; Edgew. in Linn. Proc. VI. 201; Hook. Journ. Bot. I. t. 140; Bedd. Fl. Sylv. Madr. t. 149; Brand. For. Fl. 86. t. 17; Hf. Ind. Fl. I. 632.

HAB. Common in the leaf-shedding, especially the dry and savannah-forests, of Prome and Ava, less frequent in those of the other provinces; also frequently cultivated in and around villages.—Fl. Aug., Sept.; Fr. Octob. to Jan.

2. *Z. OENOPLIA*, Mill. Dict. No. 3; Roxb. Fl. Ind. I. 611; Hf. Ind. Fl. I. 634, excl. syn. *Z. albens*, Roxb.—(*Z. Napoca*, Roxb. Fl. Ind. I. 613, non L.).

VAR.  $\alpha$ . *GLABRESCENS*, leaves green on both sides, shortly and thinly pubescent. Usually a straggling shrub.

VAR.  $\beta$ . *FERRUGINESCENS*, leaves tawny villous beneath; usually a lofty climber.

VAR.  $\gamma$ . *PEDICELLARIS* (*Z. pedicellaris*, Wall. Cat. 4243), as preceding, but cymes longer peduncled and larger, pedicels about 3 lin. long.

HAB. Common all over Burma and the adjacent islands, as well in the leaf-shedding as in the evergreen forests; var.  $\beta$ . is a more southern form, frequent in Martaban, Tenasserim, the Andamans, etc.; var.  $\gamma$ . in Prome.—Fl. Sept. Octob.; Fr. C. S.



3. *Z. GLABRA*, Roxb. Fl. Ind. I. 614.—(*Z. Horsfieldii*, Miq. Fl. Ind. Bat. I. 643; *Z. venulosa*, Wall. Cat. 4235).

HAB. Frequent in the tropical forests, all over Burmah, from Ava and Chittagong down to Tenasserim and the Andamans.—Fr. C. S.

Prof. Lawson has created not a little confusion as regards this species. Without taking the trouble of studying Roxburgh's description, he based his identification upon Wallich's No. 4242 (doubtfully marked as *Z. glabra*), which is probably a glabrescent form of *Z. rugosa* and has nothing whatever to do with Roxburgh's plant. At the same time he makes quite a mélange of *Z. funiculosa*, to which he refers not only the true *Z. glabra*, but also, apparently, *Z. subquinquenervia*, Miq., from Malacca (Maingay No. 412, a variety with smaller glabrescent drupes),—both species at once distinguishable from it by the axillary cymes.

4. *Z. FUNICULOSA*, Ham. in Wall. Cat. 4234; Hf. Ind. Fl. I. 636 pp.

HAB. Ava, Khakhyen hills.

5. *Z. RUGOSA*, Lamk. Enc. Meth. III. 319; Wight Icon. t. 339; Hf. Ind. Fl. I. 636 pp. (*Z. latifolia*, Roxb. Fl. Ind. I. 607).

HAB. Frequent in all leaf-shedding forests, more especially in the open ones, all over Burmah, from Ava and Martaban down to Tenasserim. Fl. March, Apr.; Fr. May.

#### *Doubtful species.*

1. *Z. TOMENTOSA*, Roxb. Fl. Ind. I. 611.

HAB. Chittagong, where it is used for fences.

#### *Berchemia*, Neck.

##### *Conspectus of species.*

Leaves 2—4 in. long, the petiole  $\frac{1}{4}$ —1 in. long; panicle ample, terminal, . . . *B. floribunda*.  
Leaves 1—1 $\frac{1}{2}$  in. long, the petiole about 3 lin. long; racemes axillary, . . . *B. polyphylla*.

1. *B. FLORIBUNDA*, Wall. Cat. 4256; Hf. Ind. Fl. I. 637.—(*Zizyphus floribunda*, Wall. in Roxb. Fl. Ind. II. 368).

HAB. Ava, Khakhyen hills (J. Anderson).

2. *B. POLYPHYLLA*, Wall. Cat. 4259; Hf. Ind. Fl. I. 638.

HAB. Ava, Taong dong (*teste* Lawson).

#### *Sageretia*, Brong.

1. *S. THEEZANS*, Brongn. in Ann. d. sc. nat. 1 ser. X. 360; Hf. Ind. Fl. I. 641. VAR.  $\beta$ . *DIOSPYRIFOLIA*, Laws. in Hf. l. c. 462.

HAB. Ava.—Fl. Octob.

#### *Scutia*, Comm.

1. *SC. MYRTINA*, (*Rhamnus myrtinus*, Burm. Fl. Ind. 1768. 60; *Rhamnus circumscissus*, L. f. Suppl. 1781. 152; Roxb. Fl. Ind. I. 603;



*Scutia Indica*, Brongn. in Ann. d. sc. nat. X. 368; Wight Ill. t. 73; Hf. Ind. Fl. I. 640; *Rhamnus lucidus*, Roxb. Fl. Ind. I. 605).

VAR.  $\alpha$ . RETUSA, leaves retuse or blunt.

VAR.  $\beta$ . ACUTIFOLIA, leaves acute.

HAB. Var.  $\beta$ . Tenasserim, along the Attaran river.

### Colubrina, L. C. Rich.

#### *Conspectus of species.*

Leaves and cymes glabrous, ..... *C. Asiatica*.

Cymes and under surface of leaves pubescent, ..... *C. pubescens*.

1. *C. ASIATICA*, Brongn. in Ann. d. sc. nat. 1 ser. X. 369; Wight Ill. t. 74; Hf. Ind. Fl. I. 642.—(*Ceanothus Asiaticus*, L. sp. pl. 284; Roxb. Fl. Ind. I. 615; *Rhamnus acuminatus*, Colebr. in Roxb. Fl. Ind. I. 615).

HAB. Frequent in the beach- and coast-forests along the sea-shore, from Arracan down to Tenasserim and the Andamans.—Fl. Febr.; Fr. March Apr.

2. *C. PUBESCENS*, Kurz in Journ. As. Soc. Beng. 1872. 301; Hf. Ind. Fl. I. 642.

HAB. Frequent in the open, especially the low forests, all over Pegu and Martaban; also entering the tropical forests.—Fl. March; Fr. Apr. May.

### Apteron, Kurz.

1. *A. LANCEOLATUM*, Kurz in Journ. As. Soc. Beng. 1872. 301; Hf. Ind. Fl. I. 643.

HAB. Upper Tenasserim, Moulmein District (Brandis, Falconer).—Fl. Febr.

### Gouania, L.

#### *Conspectus of species.*

Leaves glabrous or nearly so, crenate; racemes puberulous, glabrescent: disk glabrous,

5-horned: capsules glabrous, ..... *G. leptostachya*.

Leaves velvety above, densely tawny or rusty pubescent beneath, entire; racemes rusty-tomentose; capsules puberulous, ..... *G. Brandisii*.

1. *G. LEPTOSTACHYA*, DC. Prod. II. 40; Wight, Icon. t. 974; Griff. Not. Dicot. 493. t. 585. f. 2; Hf. Ind. Fl. I. 643.—(*G. tiliaefolia*, Roxb. Corom. Pl. I. t. 98. and Fl. Ind. I. 632).

HAB. Frequent in the mixed forests and in shrubberies along streams and around villages, all over Burma down to Tenasserim.—Fl. Close of R. S. Fr. C. S.

2. *G. BRANDISII*, Hassk. in Flora 1871. 280, in adnot.—(*G. integrifolia*, Kurz in Journ. As. Soc. Beng. 1870. 49, non Lamk.).





HAB. Not unfrequent in the tropical forests of Martaban and Tenasserim.—Fr. Febr. March.

This species may eventually turn out to be only an entire-leaved form of *G. Javanica*, Miq., but the flowers are still unknown.

### AMPELIDEÆ.

#### *Conspectus of species.*

VITIS. Stamens free. Ovary 2-celled, with 2 ovules in each cell. Tendril-bearing climbers.

LEEA. Stamens and petals united with the disk. Ovary 3—6-celled, with a solitary ovule in each cell. Erect shrubs or trees, without tendrils.

### Vitis, L.

#### *Conspectus of species.*

Subg. I. VITIS (sens. extens.). Inflorescences branched in the usual way, not dilated and confluent.

§ 1. *Flowers in leaf-opposed or axillary true cymes. Flowers usually 4-merous. (Cissus.)*

O Leaves compound, from simple and pedately 3—9 or more foliolate to digitate, or if simple-leaved jointed with the petiole (1—2-foliate).

+ Leaves pedately or pinnately foliolate, very rarely spuriously digitate.

† Style short, spreadingly 4-lobed, or the 4-lobed or 4-cleft stigma sessile.

\* Style short, spreadingly 4-lobed at the apex.  
Flowers often unisexual.

Leaves 3-foliate; berries  $1\frac{1}{2}$  in. in diameter; seed obovoid, grooved on the back, the groove with a linear tubercle; stem very warty..... *V. tuberculata*.

Hermaphrodite; leaves coriaceous, 3-foliate, the leaflets very shortly petioluled, .. *V. assimilis*.

Flowers unisexual; leaves sappy membranous, 3-foliate to pedately 5-foliate; cymes short; seeds oblong, smooth, ..... *V. oxyphylla*.

\* \* Stigma sessile, 4-lobed or cleft. Flowers often unisexual.

All parts, also the very short cyme, glabrous; leaves 3-foliate, sappy herbaceous; pedicels short, cymulose; berries white, pea-shaped, ..... *V. angustifolia*.

Very much as the preceding, but cymes very slender and large, puberulous; seeds half-orbicular, broadly and shallowly furrowed above with a long blunt ridge in the furrow, the sides transversely rugate, ..... *V. bracteolata*.

Glabrous or the petioles and cyme often puberulous; leaves pedate, or the upper ones often 3-foliate, sappy coriaceous; berries white, the size of a cherry or smaller; seeds obovoid-oblong, rugulose, broadly and shallowly furrowed on the back, .. *V. lanceolaria*.

Glabrous; leaves pedate, herbaceous-fleshy; pedicels 2—3 lin. long, umbellulate; berries black, the size of a pea, ..... *V. serrulata*.





- Very much as the preceding, but young shoots and petioles rusty hirsute; leaves spuriously digitate, ..... *V. obtecta*.  
 † † Style simple, entire.  
 \* Leaves all 3-foliolate.
- Glabrous; cymes leaf-opposed, glabrous; leaves glaucous beneath, .... *V. semicordata*.  
 All parts shortly puberulous rarely glabrous; cymes axillary or on axillary shoots, puberulous, ..... *V. trifolia*.  
 \* \* Leaves pedate.  
 × Cymes leaf-opposed and spuriously axillary, *i. e.* the cyme terminating an axillary leafy or leafless shoot.
- All parts densely puberulous or pubescent, ..... *V. Teymanni*.  
 All parts glabrous; leaves sparingly pubescent along the nerves beneath, .. *V. Japonica*.  
 × × Cymes truly axillary, long-peduncled.
- Leaflets cuneate-obovate, rather blunt or acute, slightly pubescent along the nerves beneath; seeds triangular with sharp margins, muricate on the back, .. *V. tenuifolia*.  
 All parts pubescent to almost glabrous; leaflets finely acuminate; seeds hemispherical, smooth, ..... *V. pedata*.  
 + + Leaves truly digitate.
- All parts puberulous; cymes axillary and terminal on axillary shoots; leaflets 1½—2 in. long; style simple, ..... *V. auriculata*.  
 Leaves glabrous; leaflets 4—6 in. long, fleshy herbaceous; cymes puberulous; berries globose, style simple, bark red, ..... *V. erythroclada*.  
 Leaves glabrous: leaflets 4—6 in. long, coriaceous; cymes almost sessile, very slenderly branched, puberulous; flowers minute, dioecious; stigma peltately 4-lobed, almost sessile; seeds curved-oblong, ..... *V. campylocarpa*.  
 O O Leaves simple or very rarely (in *V. Anamallayana*\*) the uppermost ones 3-foliolate. Cymes leaf-opposite (except in *V. Wallichii*).  
 × Branches and branchlets cornered, sometimes almost winged and fleshy.
- Branchlets very fleshy, 4-cornered, jointed; leaves small, fleshy, bluntish crenate; cymes simple, ..... *V. quadrangularis*.  
 Branchlets bluntish 5-angular, thick and glossy; leaves remotely bristly toothed, long-petioled, ..... *V. pentagona*.  
 Branchlets sharply 6-cornered; leaves bristly serrate, herbaceous; cymes compound, peduncled or sessile; seeds obliquely obovate, transversely wrinkled on the faces, .. *V. discolor*.
- As preceding; leaves shorter petioled, while young appressed hairy on the nerves beneath; seeds smooth, obovate, ..... *V. costata*.  
 × × Branches and branchlets terete or nearly so.  
 † Cymes axillary; branchlets angular?
- Leaves slightly 3-lobed, glabrous, sappy membranous, large; seeds globose, smooth, .. *V. Wallichii*.  
 † † Cymes leaf-opposed.
- Branchlets terete, whitish pruinous; all parts glabrous; seeds smooth, ..... *V. repens*.  
 All parts, especially while young, rusty or tawny tomentose or pubescent, more or less

\* This species is so near to *V. repens* that I should not wonder if it were to turn out to be only an abnormal state of it.



glabrescent; leaves sharply acuminate, never lobed; seeds obovate, shallowly lacunose, ..... *V. adnata*.

All younger parts rusty tomentose or pubescent, glabrescent; leaves large, often somewhat 3-lobed, bluntish acuminate, deciduous; seeds obovate, smooth, .. *V. Linnæi*.

§ 2. Inflorescence a modification of the tendrils, cymose-panicled, racemose or spiked, or more usually the one or both tendril-branches transformed into a panicle. Flowers 4- or more usually 5-merous. (Eu-Vitis.)

\* Flowers pedicelled, in loose or contracted panicles.

+ Seeds 2—4 lin. long, shallowly grooved and more or less distinctly radiately furrowed on the back.

× Glabrous or nearly so.

Cymose panicles ample, glabrous, with or without tendrils; pedicels thick, nearly a line long; leaves 3—5-lobed, the lobes usually acute, ..... *V. latifolia*.

× × All parts more or less woolly-tomentose.

Branchlets, peduncles and usually the petioles covered with a woolly tomentum intermixed with black spreading stiff hairs; leaves almost glabrous, ..... *V. barbata*.

Branchlets, etc. woolly without black hairs; leaves lobed to palmately lobed; panicles usually tendril-bearing, short and rather compact; pedicels very short and thick, .. *V. tomentosa*.

† † Seeds about a line long, longitudinally furrowed on the back, almost smooth, glossy-black.

Branchlets, etc., woolly, without black hairs; leaves tawny woolly beneath, slightly lobed; panicles usually tendril-bearing, woolly, large and lax; pedicels very slender, 1½ lin. long, ..... *V. lanata*.

\* \* Flowers sessile, in spikes, the spikes forming elongate panicles.

Young parts thinly and fugaceously woolly; leaves pedately 5—7-foliolate, glabrous except on the nerves beneath; spikes in very slender panicles, ..... *V. Helferi*.

Quite glabrous; leaves digitately foliolate, glaucous green; spikes puberulous, forming 1½—2 ft. long stout panicles, ..... *V. polystachya*.

*Subg. II. PTERISANTHES*, Bl. Rachis of inflorescence leafy expanded and fleshy-membranous, the flowers sessile, unisexual.

Glabrous; leaves simple; a very slender twiner, ..... *V. polita*.

1. *V. TUBERCULATA*, Laws. in Hf. Ind. Fl. I. 656.

HAB. Pegu (*teste* Lawson).

I have not seen this species, and I suspect that it is only a large-fruited, 3-foliolate form of *V. lanceolaria*.

2. *V. ASSIMILIS*, Kurz in Journ. As. Soc. Beng. 1872. 302.—(*V. lanceolaria* var. 2, *assimilis*, Laws. in Hf. Ind. Fl. I. 660).

HAB. Not rare in the drier hill-forests of the Martaban hills, east of Tounghoo, at 3—4000 ft. elevation.—Fl. March.

3. *V. OXYPHYLLA*, Wall. Cat. 6035.

HAB. Frequent in the tropical forests of the eastern slopes of the Pegu Yomah and the Martaban hills, east of Tounghoo.—Fl. March.

4. *V. LANCEOLARIA*, Wall. ap. WA. Prod. I. 128: Wight Icon. t. 177; Hf. Ind. Fl. I. 660, excl. syn. *C. feminea*; Miq. Ann. Mus. Lugd.



Bat. I. 78.—(*Cissus lanceolaria*, Roxb. in Wall. Fl. Ind. I. 430; *V. muricata*, WA. Prod. I. 128; Wight Icon. t. 740).

VAR.  $\alpha$ . LANCEOLARIA, cymes loose and ample, densely puberulous, the pedicels longer and slender: petioles and petiolules puberulous (*Cissus lanceolaria*, Roxb. l. c.; *V. Hookeri*, Laws. in Hf. Ind. Fl. I. 661?)

VAR.  $\beta$ . TUBERCULATA (*Cissus tuberculata*, Bl. Bydr. 189), cymes short and often somewhat compact, less puberulous or glabrous, the pedicels usually shorter and thicker; petioles, &c., all glabrous; berries and seeds usually smaller.

HAB. Both varieties, but more so var.  $\beta$ ., common in the tropical forests all over Martaban down to Tenasserim and the Andamans; also along the eastern slopes of the Pegu Yomah; Chittagong.—Fl. Febr. March; Fr. Apr. May.

VAR.  $\alpha$ . is in my opinion the true Roxburghian plant, while var.  $\beta$ . is Blume's *Cissus tuberculata*.

5. V. SERRULATA, Wall. ap. Miq. Ann. Mus. Lugd. Bat. I. 77. (*Cissus serrulata*, Roxb. Fl. Ind. 1820. I. 114; *Cissus capriolata*, Royle Ill. Him. Pl. t. 26; *V. capriolata*, Don. Prod. Nep. 188; Hf. Ind. Fl. I. 659).

VAR.  $\alpha$ . CAPRIOLATA, all parts quite glabrous.

VAR.  $\beta$ . SUBOBTECTA, branches and petioles rusty-pubescent like those of *V. obtecta*, and forming a transition to it, the leaves partially becoming digitate.

HAB. Frequent along mountain-streams in the tropical forests of Martaban, up to 3000 ft. elevation; Ava, Khakhyen hills; Chittagong; var.  $\beta$ . Ava, Khakhyen hills.—Fr. Febr. March.

6. V. OBTECTA, Wall. Cat. 6026; Hf. Ind. Fl. I. 657.

HAB. Ava, Khakhyen hills (J. Anderson).

7. V. SEMICORDATA, Wall. in Roxb. Fl. Ind. II. 1824. 481.—(*V. Himalayana*, Brand. For. Fl. 100; Hf. Ind. Fl. I. 655).

VAR.  $\alpha$ . SEMICORDATA, Laws. in Hf. Ind. Fl. I. 656.—(*V. semicordata*, Wall. l. c.) young parts, inflorescence, and leaflets beneath, shortly and sparingly hairy.

VAR.  $\beta$ . HIMALAYANA, (*V. Himalayana*, Brand. l. c.; *V. Neilgherrensis*, Wight Icon. t. 965; *Ampelopsis Himalayana*, Royle Ill. Him. Pl. 149), all parts quite glabrous, leaflets glaucous beneath.

HAB. Var.  $\beta$ . in the drier hill-forests of the Martaban hills, east of Tounghoo, at about 3000 ft. elevation.—Fl. March.

8. V. TRIFOLIA, L. sp. pl. 293; Bth. Fl. Austr. I. 449.—(*Cissus carnosa*, Lamk. Diet. I. 31; Roxb. Fl. Ind. I. 409; *V. carnosa*, WA. Prod. I. 127; Wight Icon. t. 171; Hf. Ind. Fl. I. 654).

VAR.  $\alpha$ . GENUINA, all parts shortly greyish pubescent.





VAR.  $\beta$ . GLABRATA, all parts glabrous or nearly so.

HAB. Rather frequent all over Burma, especially in rubbishy places, in hedges, and shrubberies, becoming a powerful climber in the forests.—Fl. R. S.

I follow Miquel in adopting Linné's oldest name, which is evidently given in allusion to the trefoil (*Trifolium*).

9. V. TEYSMANNI, Miq. in Ann. Mus. Lugd. Bat. I. 82.—(*Cissus Teysmanni*, Miq. Suppl. Fl. Sumatr. 516; *V. mollis*, Wall. Cat. 6025; Hf. Ind. Fl. I. 660).

HAB. Chittagong (*teste* Lawson).

10. V. JAPONICA, Thbg. Fl. Jap. 104.—(*Cissus Japonica*, DC. Prod. I. 632; *Cissus leucocarpa*, Bl. Bydr. 189; Miq. Fl. Ind. Bat. I/2. 663; *V. cymosa*, Roxb. in Wall. Cat. 6017).

HAB. Frequent along mountain-streams and on moist rocks in the tropical forests of the Pegu Yomah, and from Martaban down to Tenasserim; also Ava, Taongdong.—Fl. R. S.; Fr. Jan. Febr.

11. V. TENUIFOLIA, WA. Prod. I. 129; Hf. Ind. Fl. I. 660 in part.

HAB. In the mixed forests of the Pegu Yomah and Arracan; also in bamboo-jungles of the Andamans.—Fl. May, June.

Possibly only a more luxuriant form of the preceding species, with more obtuse leaflets and truly axillary cymes.

12. V. PEDATA, Wall. ap. WA. Prod. I. 128; Hf. Ind. Fl. I. 661. (*Cissus pedata*, Lamk. Dict. I. 31; Roxb. Fl. Ind. I. 413).

VAR.  $\alpha$ . GENUINA, leaves pedately foliolate, pubescent.

VAR.  $\beta$ . GLABRATA, as preceding, but pretty glabrous.

HAB. Var.  $\alpha$ . frequent in leaf-shedding forests and more especially in hedges and shrubberies of the cultivated alluvial plains; var.  $\beta$ . in tropical forests of the Andamans.—Fl. Begin of R. S.

13. V. AURICULATA, Wall. ap. WA. Prod. I. 129; Wight Icon. t. 145; Hf. Ind. Fl. I. 658.—(*Cissus auriculata*, Roxb. Fl. Ind. I. 411).

HAB. In the mixed forests of the Pegu Yomah; Chittagong.—Fl. Begin of R. S.

14. V. ERYTHROCLADA, Kurz in Journ. As. Soc. Beng. 2872. 301.

HAB. Not unfrequent in the tropical and other forests along streams of the Pegu Yomah and Martaban east of Tounghoo.—Fl. March.

Amongst the digitate species, this comes nearest to *V. saponaria*, Seem.

15. V. CAMPYLOCARPA, Kurz in Journ. As. Soc. Beng. 1872. 302; Hf. Ind. Fl. I. 657.—(*Cissus feminea*, Roxb. Fl. Ind. I. 410?; *Panax micranthum*, Wall. Cat. 4938).

HAB. In the tropical forests of the slopes on eastern face of Kambala toungh, Pegu Yomah, at 1000—2000 ft. elevation; Ava, Taong Dong (Wall.)—Fl. Nov.; Fr. March.



Diœcious, remarkable for its minute flowers, and in this respect resembling *V. pubiflora*, Miq. (syn. *V. peduncularis*, Lawson). Lawson says that it has no tendrils, but in this he is mistaken. I believe it to be Roxburgh's *C. feminea*, but not having seen the female flowers, I hesitate to pronounce its identity with that species. Lawson confidently reduces *C. feminea* to a synonym of *V. lanceolaria*, but the digitate leaves alone forbid a comparison with it.

16. *V. QUADRANGULARIS*, Wall. ap. WA. Prod. I. 125; Wight Icon. t. 51; Hf. Ind. Fl. I. 645.—(*Cissus quadrangularis*, L. Mant. 39; Roxb. Fl. Ind. I. 407).

HAB. Frequent in wild shrubby and waste places and in the dry forests of the Prome district; also Ava.—Fl. Nov.

17. *V. PENTAGONA*, Voigt Cat. Hort. Calc. 28; Kurz in Journ. As. Soc. Beng. 1870. 74; Hf. Ind. Fl. I. 646.—(*Cissus pentagona*, Roxb. Fl. Ind. I. 408).

HAB. Not unfrequent in the tropical forests of the eastern slopes of the Pegu Yomah, and from Chittagong and Arracan down to the Andamans.—Fl. Octob.; Fr. Apr. May.

In Journ. As. Soc. *l. c.*, I stated that *Cissus hastata*, Miq. (= *V. hastata*, Miq. Ann. Mus. Lugd. Bat. 1863. I. 85., a species which Lawson 12 years later rechristens *V. sagittifolia*, Laws. in Hf. Ind. Fl. 1875. I. 645) was identical with *V. glaberrima*, Wall. This is an error, which arose from my having solely consulted the Wallichian specimens of *V. glaberrima*, which all happen to be *V. hastata*.

18. *V. DISCOLOR*, Dalz. in Hook. Kew. Misc. II. 39; Miq. Ann. Mus. Lugd. Bat. I. 86; Hf. Ind. Fl. I. 647, excl. syn. *V. costata*.—(*Cissus discolor*, Bl. Bydr. 281; Bot. Mag. t. 4763; *Cissus velutinus*, Linden in Bot. Mag. t. 5207).

VAR. *α*. DISCOLOR, leaves usually spotted, purplish beneath, on very long petioles (at least the lower ones); cymes peduncled.

VAR. *β*. SESSILIS, Miq. in Ann. Mus. Lugd. Bat. I. 86, cymes sessile and umbelately branched already from the base.

HAB. Var. *α*. frequent in the tropical forests and moister bamboo-jungles, from Arracan, the Pegu Yomah, and Martaban down to Tenasserim and the Andamans; var. *β*. in the Martaban hills, east of Tounghoo.—Fl. R. S.; Fr. C. S.

19. *V. COSTATA*, Wall. Cat. 6011.

HAB. Not unfrequent in the open and the mixed forests of Pegu and Arracan; also Martaban.—Fr. H. S.

20. *V. WALLICHII*, Kurz in Journ. As. Soc. Beng. 1872. 302, non DC. (*Leea cordata*, Wall. Cat. 6819.)

HAB. Ava, Irrawaddi valley at Meaong.



Very near to *V. pallida*, WA., as Lawson has pointed out, but the axillary cymes distinguish it from that species.

21. *V. REPENS*, WA. Prod. I. 125; Hf. Ind. Fl. I. 646.—(*Cissus repens*, Lamk. Dict. I. 31; DC. Prod. I. 628; Rheed. Hort. Malab. VII. t. 48; *V. glauca*, WA. Prod. I. 126; *Cissus glauca*, Roxb. Fl. Ind. I. 406; DC. Prod. I. 628; *Cissus glauca*, Roxb. Fl. Ind. I. 406; *Cissus Blumeana*, Steud. Nomencl.; Miq. Fl. Ind. Bat. I/2. 605; *Cissus cerifera*, T. et B. in Natuurk. Tydsch. Ned. Ind. XXIV. 324).

HAB. Frequent as well in the tropical as in the moister mixed forests, all over Burma, from Chittagong and Ava down to Tenasserim and the Andamans.—Fl. R. S.; Fr. C. S.

22. *V. ADNATA*, Wall. ap. WA. Prod. I. 126; Wight Icon. t. 144; Hf. Ind. Fl. I. 649.—(*Cissus adnata*, Roxb. Fl. Ind. I. 405).

VAR.  $\alpha$ . GLABRIOR, Miq. in Ann. Mus. Lugd. Bat. I. 87, all parts more glabrous, leaves only along the nerves beneath pubescent.

VAR.  $\beta$ . COMMUNIS, all parts more or less rusty tomentose; leaves above glabrous or puberulous, beneath wholly or only along the nerves tomentose.

HAB. Var.  $\alpha$ . rarely in the hill-toungyas of the Martaban hills, at 3000—4000 ft. elevation; var.  $\beta$ . frequent in all leaf-shedding forests and in shrubberies and village-bushes, more especially along choungs, all over Burma and adjacent provinces.—Fl. Close of R. S.; Fr. H. S.

23. *V. LINNÆI*, Kurz, non Wall.\*—(*Cissus vitiginea*, L. sp. pl. 117; Roxb. Fl. Ind. I. 406; *V. repanda*, WA. Prod. I. 125; Hf. Ind. Fl. I. 648).

HAB. Frequent as well in the mixed and open forests as also in shrubberies and grass jungles, all over Burma and adjacent provinces down to Tenasserim.—Fl. H. S. and Close of R. S.; Fr. C. S.

Lawson identifies Roxburgh's *Cissus vitiginea* with *V. lanata*, but he has never formed a clear conception of the difference between the inflorescence of the *Vitis*-section and that of the *Cissus*-section: hence the error.

24. *V. LATIFOLIA*, Roxb. Fl. Ind. I. 661; WA. Prod. I. 130; Hf. Ind. Fl. I. 652.

HAB. Frequent in the savannahs and savannah jungles, also in shrubberies and village woods, but rather rare in the leaf-shedding forests, all over the Pegu plains, especially in the Sittang valley; also Andamans, in forests.—Fl. Apr. May.

N. B.—*V. vinifera*, L. is often seen cultivated by Europeans, and is said to bear good grapes in Ava.

\* Whose name has to be changed into *Vitis angulata* (*Cissus angulata*, Lamk.). Mr. C. B. Clarke informs me, that my *Vitis spectabilis* is not a climber, but a perfectly erect perennial about 2 ft. high, nearly simple, without tendrils. It grows in the Sikkim Terai only.





25. *V. BARBATA*, Wall. in Roxb. Fl. Ind. II. 478; Hf. Ind. Fl. I. 651.

VAR. *α. GENUINA*, leaves only thinly lanate beneath, black hairs numerous and conspicuous.

VAR. *β. JENKINSII*, leaves entire or lobed, their undersurface as well as the stems densely tawny or rusty woolly-tomentose, black hairs very sparingly interspersed among the tomentum.

HAB. Frequent in the low and lower mixed forests, all over Ava and Martaban down to Tenasserim; var. *β.* Ava, Taong Dong (Wall. Cat. 5994 B.).—Fl. Apr. May.

26. *V. TOMENTOSA*, Heyne in Roth. Nov. sp. 157; DC. Prod. I. 634; WA. Prod. I. 130; Wight Ill. I. t. 57; Hf. Ind. Fl. I. 650.

HAB. In deserted toungyas of the Martaban hills, east of Tounghoo, at 3—4000 ft. elevation.—Fl. Fr. March.

27. *V. LANATA*, Roxb. Fl. Ind. I. 660; WA. Prodr. I. 131; Hf. Ind. Fl. I. 651, excl. syn. *C. vitiginea*, Roxb.

HAB. Not unfrequent in deserted toungyas of Martaban and Tenasserim; also Ava and Chittagong.—Fl. Fr. Febr. March.

28. *V. HELFERI*, Laws. in Hf. Ind. Fl. I. 662.

HAB. Tenasserim (Helf. 1341).

29. *V. POLYSTACHYA*, Wall. Cat. 6028; Hf. Ind. Fl. I. 662.

HAB. Tenasserim or Andaman islands, *teste* Lawson.

30. *V. POLITA*, Miq. in Ann. Mus. Lugd. Bat. I. 95; Hf. Ind. Fl. I. 663.

HAB. Tenasserim, Moulmain (Lobb), *teste* Lawson.

#### *Doubtful species.*

1. *V. dubia*, Laws. in Hf. Ind. Fl. I. 661.

HAB. Chittagong? *teste* Lawson.

Not recognisable from the description alone, the more so as Lawson's arrangement, or I should rather call it disarrangement, of the species of *Vitis* is based upon purely technical and more or less variable characters, without reference to natural affinity. Should it really be *Vitis* No. 41 of Hf. and Th. Herb. Ind. orient., as I strongly suspect, it will be a pedately foliolate form of *V. oxyphylla*, Wall.

#### *Leea*, L.

##### *Conspectus of species.*

× Leaves ample, simple or rarely 3-foliolate.

Leaves simple, large, very glaucous and shortly puberulous beneath; lobes of the staminal tube entire; shrubby, ..... *L. macrophylla*.

Leaves simple and pinnately 3-foliolate, hardly glaucescent but minutely puberulous beneath; lobes of the staminal tube notched; shrubby, ..... *L. latifolia*.





\* \* Leaves from simply pinnate to decom-pound.

O All parts (except the inflorescence in a few species) glabrous.

† Inflorescence with persistent and conspicuous bracts and bractlets.

Slender treelet; flowers sessile or nearly so, crowded, greenish-white, . . . *L. compactiflora*.

† † Bracts and bractlets minute, usually already dropped before the flower-buds are properly developed.

\* Leaves coriaceous. Flowers greenish-white or green with a purplish hue.

Leaves more or less glaucous, usually linear or lanceolate; lobes of the staminal tube erect, notched; seeds smooth and rounded on the back; undershrub, . . . *L. parallela*.

Leaves dark-green, glossy; lobes of staminal tube erect, notched; seeds even and convex on the back; a tree, . . . . . *L. sambucina*.

Leaves dark-green, glossy; lobes of staminal tube reflexed, acuminate; seeds tubercled-keeled, the edges tubercled-ribbed; a large shrub, . . . . . *L. gigantea*.

\* \* Leaves more or less membranous. Flowers red, orange, or scarlet.

Leaflets 6—8 in. long; inflorescence rusty-tomentose; undershrub, . . . . . *L. lata*.

Leaflets only 2½—4 in. long; inflorescence glabrous or nearly so, undershrub, *L. coccinea*.

O O More or less pubescent or stiff-hairy, at least the nerves beneath.

† Leaves usually simply pinnate.

Leaflets coarsely serrate, acute, roughish pubescent along the nerves beneath; nerves all parallel; petiolules thick and short; stems, petioles, and peduncles curled-winged; bracts and bractlets long, lanceolate-subulate; shrubby, . . . . . *L. crispa*.

Dwarf, all parts robust and densely pubescent or almost tomentose; petioles and petiolules terete; cymes tomentose; bracts minute; undershrub, . . . . . *L. pumila*.

† † Leaves usually 2- or 3-pinnate.

Leaflets coarsely serrate, acuminate, roughish pubescent on the parallel nerves beneath; stems and petioles terete or nearly so; peduncle compressed-cornered; bracts and bractlets small, linear-lanceolate; flowers greenish-white; shrubby, . . . *L. aspera*.

All parts stiff-pubescent; leaflets membranous, stiffly pubescent, beneath densely gland-dotted; petioles, &c., all terete; cymes stiff, pubescent; bracts large, broadly ovate, blunt; undershrub, . . . . . *L. æquata*.

Almost glabrous or greyish puberulous; leaves 2—3-pinnate; leaflets puberulous or glabrous, not gland-dotted beneath; bracts and bractlets none; shrubby, *L. robusta*.

Stems, petioles, &c., quite glabrous; leaflets small, sprinkled with white stiff hairs; bracts or bractlets none; undershrub, . . . . . *L. rubra*.

1. *L. MACROPHYLLA*, Roxb. Fl. Ind. I. 653 (non DC.), Wight Icon. t. 1154? (*L. simplicifolia*, Griff. Not. Dicot. 697. t. 645. f. 1?)

VAR. *α*. GENUINA, leaves larger and broader, usually somewhat lobed, glaucous and puberulous beneath.

VAR. *β*. OXYPHYLLA, leaves ovate to ovate-oblong, acuminate, less glaucous beneath or one-coloured, glabrous.

HAB. Var. *β*. frequent in the mixed forests, especially the upper ones, of Pegu and Martaban.—Fr. C. S.

2. *L. LATIFOLIA*, Wall. Cat. 6821.

HAB. Prome hills.

3. *L. PARALLELA*, Wall. Cat. 6828; Hf. Ind. Fl. I. 666.





VAR. *a.* GENUINA, leaves usually pinnate or occasionally bipinnate, leaflets oblong or oblong-lanceolate, more glaucous; calyx-lobes rotundate.

VAR. *β.* ANGUSTIFOLIA, (*L. angustifolia*, Laws. in Hf. Ind. Fl. I. 665), leaves usually 2—3-pinnate, leaflets narrow-linear to linear, very acuminate, calyx-lobes in fruit obtuse, but not rotundate.

HAB. Var. *a.* Ava, Irrawaddi valley; var. *β.* frequent in the mixed forests and grass jungles of Pegu, especially the Irrawaddi zone.—Fr. C. S.

4. *L. SAMBUCINA*, Willd. sp. pl. I. 1177; DC. Prod. I. 653; Roxb. Fl. Ind. I. 657; Griff. Not. Dicot. 598. t. 644. fig. 1; Rumph. Herb. Amb. IV. t. 45.—(*L. staphylea*, Roxb. Fl. Ind. I. 636; WA. Prod. I. 132; Wight Ill. t. 58. and Icon. t. 78; *L. ottilis*, DC. Prod. I. 636).

HAB. Frequent in the tropical forests of the eastern slopes of the Pegu Yomah, Arracan, and Martaban down to Tenasserim and the Andamans. Fl. March; Fr. May.

*Leea sambucina*, of the 'Flora of India' (not of authors), is a mélange of species, which Lawson explains, *more Kewensi*, by saying that there are transitional conditions so numerous that the species reduced by him cannot be maintained.

5. *L. GIGANTEA*, Griff. Not. Dicot. 697. t. 645. f. 3; Kurz in Journ. As. Soc. Beng. 1873. 65.

HAB. Tenasserim, from Moulmein down to Tavoy.—Fl. Aug. Octob.; Fr. Febr. March.

6. *L. COMPACTIFLORA*, Kurz in Journ. As. Soc. Beng. 1873. 65.

HAB. Rather rare in the drier hill-forests of the Martaban hills, east of Tounghoo, at about 3000 ft. elevation.—Fl. Apr.

7. *L. LETA*, Wall. Cat. 6831; Kurz in Journ. As. Soc. Beng. 1873. 65.

HAB. Ava (Wall.); frequent in the tropical forests of South Andaman.—Fl. June.

Very likely only a luxuriant form of the following species.

8. *L. COCCINEA*, Planch. in Hort. Donat. 6; Bot. Mag. t. 5299.

HAB. Not uncommon in the savannahs and savannah-forests of Pegu, rarely in the diluvial forests of Martaban.—Fl. May June; Fr. Jan.

9. *L. CRISPA*, L. Mant. 124; Roxb. Fl. Ind. I. 654; Hf. Ind. Fl. I. 665.—(*L. pinnata*, Andr. Bot. Repos. V. t. 355).

HAB. Frequent in the low and mixed forests of Pegu and Chittagong.

10. *L. PUMILA*, Kurz in Journ. As. Soc. Beng. 1872. 302; Hf. Ind. Fl. I. 666.

HAB. Not unfrequent in the eng and low forests of Pegu and Martaban.—Fl. probably May, June.

11. *L. ASPERA*, Wall. in Roxb. Fl. Ind. II. 468; Hf. Ind. Fl. I. 665.





HAB. Common in the mixed forests, especially in the upper ones, and in savannahs, all over Pegu.—Fr. Febr.

12. *L. EQUATA*, L. Mant. 124; Miq. in Ann. Mus. Lugd. Bat. I. 98.—(*L. hirta*, Hornem. Hort. Hafn. I. 231; Roxb. Fl. Ind. I. 656; Hf. Ind. Fl. I. 668).

HAB. Not unfrequent in the tropical forests of Martaban and Tenasserim, also Andamans.—Fl. June.

13. *L. ROBUSTA*, Roxb. Fl. Ind. I. 655, non Laws.\* (*L. aspera*, Wall. Cat. 6825; *L. diffusa*, Laws. in Hf. Ind. Fl. I. 667).

HAB. Not unfrequent in savannahs and in open grassy places of the forests of Pegu and Arracan.—Fl. Octob.; Fr. C. S.

N. B.—*L. robusta*, Laws. non Roxb. = *L. Sundaica*, Miq.

14. *L. RUBRA*, Bl. Bydr. 197; Miq. Fl. Ind. Bat. I/2. 611 and Ann. Mus. Lugd. Bat. I. 96.

HAB. Tenasserim, Attaran (Dr. Brandis).

N. B.—*L. sanguinea*, Kurz in Journ. As. Soc. Beng. 1873. 66 (not of Wall.) is *L. alata*, Edg. It is not a Burmese species, and the locality Ava should be referred to *L. lata*.

### SAPINDACEÆ.

A. Seeds with albumen. Stipules present.

Trib. I. STAPHYLEÆ. Flowers regular. Stamens inserted outside the disk. Leaves opposite.

TURPINIA. Ovary 3-celled. Fruit entire, indehiscent. Leaves pinnate, or rarely simple.

B. Seeds without albumen. Stipules none.

a. Stamens inserted outside or on the disk. Flowers regular.

Trib. II. DODONÆÆ. Stamens inserted outside the disk. Capsule septicidally dehiscent. Leaves alternate.

DODONÆA. Sepals valvate. Petals none. Ovules by pairs. Leaves usually simple.

Trib. III. ACERINEÆ. Stamens inserted on the disk. Samaras indehiscent. Leaves opposite.

ACER. Petals none or present. Disk annular. Samaras 2. Leaves simple or palmately lobed.

b. Stamens inserted inside the disk, sometimes unilateral.

Trib. IV. SAPINDEÆ. Leaves alternate, or rarely (in *Æsculus*) opposite. Flowers regular or irregular.

\* Fruit or fruit-lobes indehiscent, drupaceous, fleshy or rarely corticate or crustaceous.

× Fruit entire, 1—4-celled.

O No petals. Flowers polygamously dioecious.

SCHLEICHERA. Calyx small, valvate or nearly so. Disk unilateral. Seeds arillate. Leaves abruptly pinnate.





O O Petals present, furnished with scales. Flowers polygamously monœcious.

LEPISANTHES. Flowers regular. Disk regularly annular. Leaves pinnate.

HEMIOGYROSA. Flowers irregular. Disk unilateral, cushion-like. Leaves pinnate.

× × Fruit divided deeply or to the base into 3—2 lobes, the lobes often solitary by abortion of the others.

O Flowers irregular. Arillus none.

† Leaves pinnate. Trees.

DITTELASMA. Fruit deeply 1—3-lobed, the lobes drupaceous, globose. Testa bony. Embryo curved. Disk half crescent-shaped.

ERIOGLOSSUM. Fruit to the base 1—3-lobed, the lobes oblong. Testa membranous. Embryo straight. Disk unilateral.

† † Leaves 3—1-foliolate. Shrubs or small trees.

ALLOPHYLUS. Flowers irregular or almost regular, with the place of the 5th petal empty. Sepals orbicular. Petals with scales. Fruit-lobes fleshy or sappy. Racemes simple or compound.

O O Flowers regular.

† Seeds without arillus.

SAPINDUS. Fruit-lobes deeply or to the base separated, by 2—3 or often solitary by abortion, the pericarp crustaceous or coriaceous, smooth. Testa crustaceous or membranous.

XEROSPERMUM. Fruit-lobes separated to the base, by pairs or solitary, the pericarp crustaceous, tubercled. Testa fleshy and pilose within, resembling an arillus.

† † Seeds truly arillate.

NEPHELIUM. Fruit-lobes 1—3, separated to the base, the pericarp coriaceous to crustaceous, smooth to variously tubercled, muricate, and echinate. Seeds entirely enveloped by the arillus.

POMETIA. Fruit-lobes 1—3, separated to the base, the pericarp corticate, smooth. Seeds arillate at the lower end. Hardly different from *Nephelium*.

\* \* Fruit a dry dehiscent capsule, the valves from woody to coriaceous and membranous.

O Ovules solitary in each cell.

× Trees or shrubs. Leaves pinnate. Capsule coriaceous or woody. Flowers regular.

† Petals cucullate, or the blade shorter than the cucullate scale.

SCYTHOPETALUM. Style obsolete. Petals cucullate, without scale.

PARANEPHELIUM. Petals broadly trigonous, smaller than the cucullate scales. Style long. Capsule 3-valved, woody, tubercled or aculeate-muricate. Leaves pinnate, the end-leaflets ternate.

† † Petals flat or nearly so, longer than the scale if present, or the petals minute or wanting altogether.

CUPANIA. Calyx cup-shaped or the sepals distinct. Capsule 3-quetrous or -lobed or didymous.

× × Twining tendril-bearing undershrubs. Leaves twice ternately foliolate. Capsule bladderly-membranous, inflated. Flowers irregular.

CARDIOSPERMUM. Sepals 4, the 2 outer ones small. Petals 4, with basal scales. Disk almost reduced to 2 round or linear glands opposite the lower smaller petals.

O O Ovules by 2 or more in each cell. Trees.





× Capsule membranous or chartaceous. Flowers regular, the sepals free. Leaves pinnate, alternate.

**HARPULLIA.** Petals without scales, but sometimes with inflexed lobes at the base of the blade. Stigma linear, often twisted. Capsule didymously 2-lobed, chartaceous, not winged. Seeds arillate.

**ZOLLINGERIA.** Petals with a woolly scale. Stigma 3-toothed. Capsule by maceration of the cell-walls often 1-celled, 3- or rarely 2-winged, chartaceous. Seeds without arillus.

× × Capsule thick or fleshy-coriaceous. Flowers irregular, the calyx tubular or bell-shaped. Leaves digitate, opposite.

**ÆSCULUS.** Flowers rather showy. Stigma simple.

### **Turpinia, Vent.**

#### *Conspectus of species.*

Leaves apiculate to abruptly acuminate; flowers about 2 lin. across; fruits the size of a cherry, firmly fleshy, ..... *T. pomifera*.

Leaves almost caudate; flowers minute, about a line across: fruits the size of a small pea, ..... *T. montana*.

1. *T. POMIFERA*, DC. Prod. II. 3; Hf. Ind. I. 698 pp.—(*Dalrymplea pomifera*, Roxb. Corom. Pl. III. 276. t. 279. and Fl. Ind. I. 633; *T. sphærocarpa*, Hassk. Cat. Bog. 228; Miq. Fl. Ind. Bat. I/2. 593).

**HAB.** Frequent in the tropical forests of Pegu and still more so in those of Martaban and Tenasserim; also Chittagong.—Fl. Febr.; Fr. C. S.

2. *T. MONTANA*, (*Zanthoxylon montanum*, Bl. Bydr. 248; Miq. Fl. Ind. Bat. I/2. 670).

**VAR. α. GENUINA**, panicles very slender and lax, as long or longer than the leaves, the ultimate branchings almost filiform.

**VAR. β. NEPALENSIS**, (*Turp. Nepalensis*, Wall. Cat. 4277, non WA.; *T. pomifera* var. *Nepalensis*, Laws. in Hf. Ind. Fl. I. 699), panicles shorter and more compact, stiff.

**HAB.** Var. β. frequent in the hill-forests, especially the drier ones, and the pine-forests of Martaban, at 3000 to 7200 ft. elevation.—Fl. March.

### **Dodonæa, L.**

1. *D. VISCOSA*, L. Mant. alt. 228; Hf. Ind. Fl. I. 697.—(*D. angustifolia*, L. f. Suppl. 218; Roxb. Fl. Ind. II. 256; *D. dioica*, Roxb. l. c.; *D. Burmanniana*, DC. Prod. I. 616; Wight Ill. t. 52; *D. pentandra*, Griff. Not. Dicot. 548).

**HAB.** Sandy beaches of the sea-shores of Tenasserim, from Amherst to Mergui; also Andamans, Narcondam Island.—Fr. Febr. March.



**Acer, Lin.***Conspectus of species.*

× Leaves simple, not lobed, with 3-basal nerves.

Leaves usually whitish beneath, the petiole 1—2 in. long; cymes glabrous, branchlets blackish, ..... *A. laurinum*.

Leaves one-coloured, the petiole 3—6 lin. long; cymes panicled, glabrous; branchlets pale brown, ..... *A. lævigatum*.

× × Leaves 3-lobed and 3-nerved.

Glabrous; lobes of leaves long acuminate, entire, ..... *A. isolobum*.

1. *A. LAURINUM*, Hassk. in Tydsch. Nat. Gesch. X. 138; Miq. Fl. Ind. Bat. I/2. 582.—(*A. niveum*, Bl. Rumph. III. 193. t. 167. B. f. 1; Hf. Ind. Fl. I. 693).

HAB. Frequent in the damp hill-forests of the Nattoung mountains in Martaban; at 4000 to 7000 ft. elevation; Tenasserim; also Ava, Hookhoom valley (Griff.).

2. *A. LÆVIGATUM*, Wall. Pl. As. rar. II. 3. t. 104; Hf. Ind. Fl. I. 693.

HAB. Upper Tenasserim, Moulmein District (Falconer).

3. *A. ISOLOBUM*, Kurz in Journ. As. Soc. Beng. 1872. 302; Hf. Ind. Fl. I. 694.

HAB. Frequent in the damp hill-forests of Martaban, at 5000 to 7000 ft. elevation.

Allied to *A. trifidum*, Thbg.

**Schleichera, Willd.**

1. *SCH. TRIJUGA*, Willd. sp. pl. IV. 1096; Roxb. Fl. Ind. II. 277; Bedd. Fl. Sylv. Madr. t. 119; Brand. For. Fl. Ind. 105. t. 20; Hf. Ind. Fl. I. 681.

HAB. Common in all leaf-shedding forests, especially the mixed ones, from Ava and Martaban down to Tenasserim.—Fl. March, Apr.

**Lepisanthes, Bl.***Conspectus of species.*

Leaves quite glabrous, not stiff; racemes short and dense, clustered to almost solitary, axillary; pedicels very robust, about  $\frac{1}{2}$  lin. long; petals inside and scale glabrous, ..... *L. montana*.

Leaves large and stiff; leaflets slightly puberulous on the midrib beneath, rigid; racemes in larger or smaller axillary panicles; pedicels capillary,  $1\frac{1}{2}$ —2 lin. long; scale densely white-villous fringed; simple-stemmed, palm-like treelet, ..... *L. Burmanica*.

1. *L. MONTANA*, Bl. Bydr. 238 and Rumph. III. 151; Miq. Fl. Ind. Bat. I/2. 562.—(*L. Browniana*, Hiern. in Hf. Ind. Fl. I. 680).

HAB. Tenasserim, Tavoy and Keloben (Wall.).

2. *L. BURMANICA*, Kurz MS.—(*L. montana*, Hiern. in Hf. Ind. Fl. I. 679, non Bl.).





HAB. Not unfrequent in the tropical forests of the eastern and southern slopes of the Pegu Yomah and in Martaban, up to 2000 ft. elevation.—Fr. Febr. March.

Leaves very similar to those of *L. sessiliflora*, Bl. I fear that I am to a certain degree to blame for Hiern's misidentification of the plant, in having referred Brandis' specimens, as also my own, to Blume's *L. montana*, under which name I also put it down in my preliminary Report on the Pegu forests. It was hardly possible to avoid such mismatchings in a Report which was drawn up in less than 15 months, in which period more than 1000 species had to be named, and keys furnished for the discrimination of the species.

#### Hemigyrosa, Bl.

1. *H. CANESCENS*, Thw. Ceyl. Pl. 56. and 408 ; Hf. Ind. Fl. I. 671. (*Molinæa canescens*, Roxb. Corom. Pl. I. 43. t. 60 and Fl. II. 243).

HAB. Tenasserim, from Moulmein southwards.

I cannot lay so much stress upon the irregularity of the corolla or of the disk as to use it as a divisional character: the most naturally allied genera, such as *Hemigyrosa* and *Lepisanthes*, *Dittelasma*, *Erioglossum*, and *Sapindus*, or *Allophylus* and *Schmiedelia*, are forcibly removed from one another, and, indeed, it remains to be shewn whether this character can be upheld even as a generic differential. In *Sapindus trifolius*, L., at least, the flowers can as well be regarded as irregular, and the close affinity of this species to *Hemigyrosa canescens* cannot be denied.

#### Dittelasma, Hf.

1. *D. RARAK*, Hf. Ind. Fl. I. 672.—(*Sapindus Rarak*, DC. Prodr. I. 608 ; Bl. Rumph. III. 93. t. 169 ; *Sapindus polyphyllus*, Roxb. Hort. Beng. 29 ; Hf. Ind. Fl. I. 685).

HAB. Rather rare in the tropical forests of the Pegu Yomah ; Tenasserim, Moulmein district, rare (Revd. Parish).

#### Erioglossum, Bl.

1. *E. RUBIGINOSUM*, Brand. For. Fl. 108.—(*E. edule*, Bl. Bydr. 229 and Rumph. III. 119. t. 166, Hf. Ind. Fl. I. 672 ; *Sapindus rubiginosus*, Roxb. Corom. Pl. I. t. 62 and Fl. Ind. II. 282 ; Griff. 548).

HAB. Frequent in the tropical, rare in the moister mixed forests, from Pegu and Martaban down to Tenasserim and the Andamans.—Fl. March, Apr. ; Fr. May, June.

#### Allophylus, L.

##### Conspectus of species.

- × Rachis of racemes glabrous or nearly so. Bractlets shorter than the pedicels.





Leaflets glabrous, except a tuft of hairs in the nerve-axils beneath; racemes simple; berries the size of a pepper-corn, ..... *A. racemosus*.

× × Rachis of racemes more or less pubescent or villous.

All softer parts and leaves pubescent or villous-pubescent; bractlets minute; berries the size of a pepper-corn, ..... *A. serratus*.

Rather glabrous, the nerves of the leaves villous above: racemes usually recurved, the bractlets linear-subulate, as long or longer than the pedicels; berries the size of a pea, ..... *A. aporeticus*.

1. *A. LITTORALIS*, Bl. Rumph. III. 124. (*Schmidelia littoralis*, Bl. Bydr. 232; *Ornithrophe glabra*, Roxb. Fl. Ind. II. 267).

HAB. Frequent in the tidal and beach-forests, from Chittagong down to Pegu and Tenasserim; also Andamans.—Fl. Febr. to July.

2. *A. SERRATUS*, (*Schmidelia serrata*, DC. Prod. 610; WA. Prod. I. 110; *Schmidelia villosa*, Wight Icon. t. 401; *Ornithrophe villosa*, Roxb. Fl. Ind. II. 265).

HAB. Coast-forests from Chittagong and Arracan down to Tenasserim.

3. *A. APORETICUS*, (*Schmidelia aporetica*, Kurz in Journ. As. Soc. Beng. 1870. 74; *Ornithrophe aporetica*, Roxb. Fl. Ind. II. 264).

HAB. Frequent in the upper mixed forests of Arracan, up to 1200 ft. elevation.—Fl. Fr. Octob.

Hiern makes 2 species of Indian *Allophyli*, viz., those with 1- and those with 3-foliolate leaves, but this character falls to the ground, inasmuch as his *A. zeylanicus* var. 6 *grandifolia* (= *Schmidelia chartacea*, Kurz in Journ. As. Soc. Beng. 1874. 183) has sometimes 1- and 3-foliolate leaves on the same branch. I have not been able as yet to study this genus, but I have little doubt but that Hiern's eminently practical conclusions will not stand a scientific test.

### Sapindus, Plum.

#### Conspectus of species.

× Leaves pubescent. Leaves unpaired-pinnate.

All softer parts pubescent; leaflets in 3—4 pairs with an odd one, ..... *S. tomentosus*.

× × All parts glabrous.

O Leaves simple.

Leaves cordate at the narrowed base, the petiole very short and thick; anthers yellow; petals emarginate; the scale double, woolly; fruit-lobes the size of a pea, *S. Danura*.

Leaves acuminate or acute at the base, the petiole of the lower leaves long and longer; anthers purple: petals rounded at apex; the scale very short, simple, woolly; fruit-lobes about doubly smaller, ..... *S. verticillatus*.

O O Leaves 2-foliolate.

Petiole only about 2 lin. long; leaflets oblong, about 2 in. long, sessile; panicles very slender; fruit-lobes didymous, 1½—2 lin. long, ..... *S. microcarpus*.



1. *S. TOMENTOSUS*, Kurz MS.

HAB. Ava, Khakhyen hills, Mynela (J. Anderson).

2. *S. DANURA*, Voigt. Cat. Hort. Calc. 94; Hf. Ind. Fl. I. 684, excl. syn. *S. verticillata*, Roxb.—(*Scytalia Danura*, Roxb. Fl. Ind. II. 274; *Euphoria verticillata*, Lindl. Bot. Neg. t. 1059, non Roxb.).

HAB. Frequent in the tidal forests of the Andamans, also in those of Pegu and Tenasserim.

In this species abnormal leaves are often observed of a semipinnate and even perfectly pinnate shape. Roxburgh's *Scytalia verticillata* is in my opinion a different plant. Wallich's Cat. 8052 D., from HBC. and hills east of Sylhet, may be taken as the type of it.

3. *S. MICROCARPUS*, Kurz MS.

HAB. In the adjoining Siamese province of Kanbooree (Teyman); probably also in Upper Tenasserim.—Fr. Apr. May.

*Xerospermum*, Bl.1. *X. NORONHIANUM*, Bl. Rumph. III. 100; Miq. Fl. Ind. Bat. I/2. 552.

HAB. Tenasserim (Helf. 1006).

Mr. Hiern confounds two generically different plants, viz., the true Malayan plant and *Sapindus glabratus*, Wall. (= *Cupania glabrata*, Kurz), from Sylhet and the Khasi hills.

*Nephelium*, L.*Conspectus of species.*\* *Petals none. Calyx toothed.*

O Fruits covered with soft fleshy subulate or angular-conical prickles.

Glabrous; leaflets glaucous or whitish beneath; prickles of the fruit fleshy, long, conically angular, truncate, glabrous, ..... *N. Griffithianum*.  
As preceding but leaflets broader; prickles of fruit variously curved and incurved,  $\frac{1}{2}$ — $\frac{3}{4}$  in. long, tawny pubescent at their dilated bases, subulate or rarely 2-cleft, *N. chrysæum*.  
Leaflets more coriaceous, pale coloured beneath or almost one-coloured; fruits and prickles as in preceding but quite glabrous, ..... *N. lappaceum*.

O O Fruits tubercled.

Leaflets very coriaceous, small, the net-venation quite obsolete, the nerves thin and faint; fruit-lobes ellipsoid-oblong, the size of a prune, covered with sharp compressed-tessellate tubercles, ..... *N. Litchi*.

\* \* *Petals present. Calyx cleft to  $\frac{1}{2}$  or to near the base.*

Leaflets firmly coriaceous, glaucescent beneath, in drying fuscous, the lateral nerves thin and slightly prominent; fruit-lobes oblong, shortly muricate, the murices about a line long, sharp, ..... *N. rubescens*.  
Leaflets thin coriaceous, more or less glaucescent beneath, the numerous (14—20) lateral nerves strongly prominent beneath; fruit-lobes ovoid-oblong, the size of a plum, perfectly glabrous, strongly tubercled as in *N. Litchi*, but not tessellate, ..... *N. hypoleucum*.

As preceding but leaflets usually smaller; fruit-lobes globose, the size of a small cherry, obsoletely tubercled or almost smooth, minutely tawny velvety all over, *N. Longanum*.





1. *N. GRIFFITHIANUM*, Kurz in Journ. As. Soc. Beng. 1872. 303.—(*Sapindaceae*, Griff. Not. Dicot. IV. 550. t. 599. fig. 1).

HAB. Ava, Khakhyen hills (Griff. J. Anderson).—Fr. May.

Hiern identifies the above species with *N. mutabile*, Bl., a species which is distinguished at once by its irregularly tubercled fruit-lobes (hence-Blume formerly confounded it with *Euphoria Longan*). His description seems to have been drawn up from specimens belonging to two or three different species, but chiefly to *N. chryseum*, Bl. (Maingay No. 449, Griff. 997/1).

2. *N. LAPPACEUM*, Linn. Mant. I. 125 ; Hf. Ind. Fl. I. 687.—(*Scytalia Rampoutan*, Roxb. Fl. Ind. II. 271).

HAB. Upper-Tenasserim (Brandis).—cultivated ?

3. *N. LITCHI*, Camb. in Mém. Mus. Par. XVIII. 30 ; Wight Icon. t. 43 ; Hf. Ind. Fl. I. 687.—(*Scytalia Litchi*, Roxb. Fl. Ind. II. 269).

HAB. Chittagong, cultivated.—Fl. Febr. to March ; Fr. Apr. to June.

4. *N. RUBESCENS*, Hiern in Hf. Ind. Fl. I. 688.

HAB. Tenasserim (Wall.) *teste* Hiern.

5. *N. HYPOLEUCUM*, Kurz in Journ. As. Soc. Beng. 1871. 50 and 1874. 183, sub No. 10.

HAB. Rare in the tropical forests along the eastern slopes of the Pegu Yomah, but frequent in those of Martaban, up to 1000 ft. elevation ; also cultivated.—Fl. Jan. ; Fr. Apr.

*N. B.*—This species occurs also in Hindostan (Wight 540), Concan (Stocks, &c.), and wild in the sholas of the Pulney hills.

6. *N. LONGAN*, Camb. in Mém. Mus. Par. XVIII. 30 ; Hf. Ind. Fl. I. 689.—(*Scytalia Longan*, Roxb. Fl. Ind. II. 170 ; *Euphoria Longana*, Lamk. Dict. III. 574 ; Bot. Mag. t. 4096 ; Bot. Neg. t. 1729 ; Bedd. Fl. Sylv. Madr. t. 156 ?)

HAB. Rare in the tropical forests along the eastern slopes of the Pegu Yomah ; also cultivated.—Fl. March ; Fr. May to June.

#### *Pometia*, Forst.

1. *P. TOMENTOSA*. Bth. and Hf. Gen. pl. ; Hf. Ind. Fl. I. 691 pp. —(*Irina tomentosa*, Bl. Bydr. 236 ; Miq. Fl. Ind. Bat. I/2. 558 ; *Eccremanthus eximius*, Thw. in Hook. Kew Journ. VII. 272. t. 9 ; *P. eximia*, Bedd. Fl. Sylv. Madr. t. 157).

HAB. Common in the tropical forests of the Andamans.—Fr. May, June.

Distinguishable at once from *P. pinnata*, Forst., by its small and very differently shaped fruits.

#### *Paranephelium*, Miq.

1. *P. XESTOPHYLLUM*, Miq. Suppl. Fl. Sumatr. 509.—(*Mildea xestophylla*, Miq. Ann. Mus. Lugd. Bat. III. 88).



HAB. Tenasserim, Moulmein District (Falconer).

In HBC. are some leaves from the Khakhyen-hills which apparently represent a second Burmese species of this genus, if they should not be identical with Hiern's *Scyphopetalum*, the description of which is too imperfect to enable one to recognize from it the plant intended. They have the 3 end-leaflets similarly ternate and in texture and nervature are almost the same as the above.

### *Scyphopetalum*, Hiern.

1. *S. RAMIFLORUM*, Hiern in Hf. Ind. Fl. I. 676.

HAB. Ava, hill-forests of Hookhoom valley (Griff.) *teste* Hiern.

I have not seen this plant, and place it near *Paranephelium* simply by guess. The petals are differently described and the style is said to be obsolete,—characters which would keep it distinct from Miquel's genus.

### *Cupania*, Plum.

#### *Conspectus of species.*

*Subg. I. Eu-Cupania.* Capsules clavate-pyriform, more or less conspicuously 3-lobed or angular, coriaceous.

\* Petals present, furnished with a double scale.

× Leaves and panicles glabrous.

Leaflets opaque, glaucescent beneath, the nerves thin; rachis narrowly winged upwards, .. *C. Griffithiana*.

Leaflets glossy, one-coloured, strongly nerved and net-veined; rachis terete, *C. glabrata*.

× × Leaflets beneath and panicle shortly tawny pubescent.

Leaflets chartaceous, fuscous in drying, opaque, ..... *C. fuscidula*.

\* \* Petals none or minute, without scales.

Net-venation minute and obsolete; filaments glabrous; leaflets in 2 pairs, *C. Lessertiana*.

Net-venation strong and prominent on both sides; filaments exserted, pubescent; leaflets not fuscous, ..... *C. Sumatrana*.

Net-venation thin but prominent; filaments short, pubescent; leaflets fuscous, .. *C. Helferi*.

*Subg. II. Arytera*, Bl. Capsule nearly to the base divided into 2 divergent lobes, coriaceous.

Leaflets chartaceous, reddish fuscous beneath, glabrous; panicles tawny puberulous, .. *C. adenophylla*.

1. *C. GRIFFITHIANA*, Kurz (*C. pleuropteris*, Hiern in Hf. Ind. Fl. I. 677, non Bl.).

HAB. Tenasserim (Helf. 983).

What Mr. Hiern describes as *C. pallidula* (Maingay 442; Griff. 982) is *C. pleuropteris*, Bl.

2. *C. GLABRATA*, Kurz in Journ. As. Soc. Beng. 1872. 303. (*Sapindus glabratus*, Wall. Cat. 8095).

HAB. Rather frequent in the tropical forests along the eastern slopes of the Pegu Yomah and also in Martaban.—Fl. Apr. May.





I do not know what Hiern describes under the above name, but generally, I think, he has my plant under view. *Sapindus squamosus*, Roxb. is *Cupania regularis*, Bl., differing from it (*Sapindacea* 4. Java, Horsfield Coll. is the typical form) in having the petiolules not incrassate.

3. *C. FUSCIDULA*, Kurz in Journ. As. Soc. Beng. 1872. 302; Hf. Ind. Fl. I. 677.

HAB. Tenasserim (Helf. 993).

4. *C. LESSERTIANA*, Camb. Mém. Mus. Par. XVIII. 46. t. 3.; Hf. Ind. Fl. I. 678.

HAB. Frequent in the tropical forests of the Andamans; Tenasserim, Mergui.—Fl. May, June.

5. *C. SUMATRANA*, Miq. Fl. Ind. Bat. I/2. 609; Hf. Ind. Fl. I. 678.

HAB. Rare in the tropical forests of the Central Pegu Yomah; apparently frequent in Tenasserim from Moulmein down to Mergui.—Fr. Apr. May.

6. *C. HELFERI*, Hiern in Hf. Ind. Fl. I. 679.

HAB. Tenasserim or Andamans (Helf.) *teste* Hiern.

Not known to me, unless No. 982/1 of Helfer's collection be meant.

7. *C. ADENOPHYLLA*, Planch. in Hf. Ind. Fl. I. 677.

HAB. Tenasserim, from Moulmein to Mergui.

### **Cardiospermum, L.**

#### *Conspectus of species.*

Slightly pubescent or glabrous; leaflets often acuminate produced; flowers 1—1½ lin.,  
..... *C. Halicacabum*.

Softly pubescent; leaflets usually short and broad; flowers 2—3 lin., ..... *C. canescens*.

1. *C. HALICACABUM*, L. sp. pl. 925; Roxb. Fl. Ind. II. 292; Wight Icon. t. 508; Bot. Mag. t. 1049; Griff. Dicot. 546. t. 599; Hf. Ind. Fl. I. 670.

HAB. Not unfrequent in waste places, along river banks, &c., of the plains, all over Burma.—Fl. and Fr. H. and R. S.

2. *C. CANESCENS*, Wall. Pl. As. rar. I. 14. t. 14; Wight Icon. t. 74; Hf. Ind. Fl. I. 670.

HAB. Ava, apparently common.—Fl. Fr. ∞.

### **Harpullia, Roxb.**

1. *H. CUPANIOIDES*, Roxb. Fl. Ind. I. 645; Hf. Ind. Fl. I. 691 (*Streptostigma viridiflorum*, Thw. in Hook. Journ. Bot. VI. 298. t. 9. A; *H. imbricata*, Thw. Enum. Ceyl. Pl. 56; Bedd. Fl. Sylv. Madr. t. 158).

HAB. Frequent in the tropical forests of the Andamans; Chittagong. Fl. June.



**Æsculus, L.**

1. *A. ASSAMICA*, Griff. Not. Dicot. 541.—(*Hippocastaneæ* sp., Griff. l. c.; *A. Punduana*, Wall. Cat. 1189, *nomen nudum*; Hf. Ind. Fl. I. 675).  
HAB. Damp hill-forests of Upper Tenasserim.—Fl. Apr.

**Zollingeria, Kurz.**

1. *Z. MACROCARPA*, Kurz in Journ. As. Soc. Beng. 1872. 303; Hf. Ind. Fl. I. 692.

HAB. Not unfrequent in the dry forests of the Prome District, along the spurs of the Yomah.—Fl. probably close of R. S.; Fr. March.

The genus is named in honour of the late H. Zollinger, the author of so many valuable botanical papers, which, owing to their being written in the Dutch language, remain almost unknown to the majority of botanists.

[To be continued.]

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XV.—*List of Reptilia and Amphibia collected by the late Dr. STOLICZKA in Kashmir, Ladák, Eastern Turkestan, and Wakhán, with descriptions of new Species.*—By W. T. BLANFORD, F. R. S., F. Z. S.

(Received Oct. 30th,—Read Nov. 4, 1875.)

The following list of the Reptilia and Amphibia in Dr. Stoliczka's collections is similar to that of the Mammalia already printed in this Journal (*ante*, p. 104), and is similarly published in anticipation of full accounts, which cannot be issued until the accompanying illustrations are ready. It is proposed to figure all new species.

The country traversed by Sir D. Forsyth's mission, to which Dr. Stoliczka was attached as naturalist, may be considered as consisting of the following zoological subdivisions:—hills between the Panjáb and Kashmir, the Kashmir valley, Ladák (the upper Indus valley, extending to the Karakoram), the Kuenluen range south of Yárkand, Eastern Turkestan (comprising the plains around Yárkand and Káshghar), Sarikol (the hilly country between the Turkestan plains and the Pámir and Wakhán).

The collections would, doubtless, have been much larger had not a great portion of the country been traversed in the depth of winter, when the ground was covered with snow, and no reptiles could be seen. None were consequently obtained on the southern slopes of the Thian Shan mountains nor on the Pámir.

The only orders of *Reptilia* represented are those of lizards and snakes. No tortoises were met with.

## REPTILIA.

### LACERTILIA.

1. *STELLIO HIMALAYANUS*.—Ladák.
2. *S. TUBERCULATUS*.—Hills between the Panjab and Kashmir.
3. *S. AGRORENSIS*.—Jhilam valley, Kashmir.
4. *S. STOLICZKANUS*, sp. nov.

*S. squamis dorsalibus mediis majoribus, haud in lineas regulares ordinatis, obtuse carinatis, lateralibus minoribus, acute carinatis, postice subæqualibus; nonnullis mucronatis circum tympanum, et in fasciculos ad latera colli et supra humeros dispositis; caudalibus carinatis, mucronatis verticillatis, dorsales vix magnitudine excedentibus; stramineus, capite dorsoque posteriore nigro-punctatis, dorso anteriore nigro, stramineo transversim fasciato.*



*Hab.*—Plains of Eastern Turkestan.

The distribution of the scales on the back is somewhat as in *S. Caucasicus*, but that appears to be a stouter form with far more enlarged scales on the sides, larger tail scales, and a patch of thickened scales in the middle of the abdomen which is wanting in the form now described. The present species may be near *S. Aralensis* (*Agama Aralensis*, Licht. in Eversmann's 'Reise nach Buchara', p. 144), the only other steppe form known, but that species is described as being very differently coloured, as having the toes fringed, and the dorsal scales strongly keeled and pointed.

##### 5. *PHRYNOCEPHALUS THEOBALDI*.

*P. Theobaldi*, Blyth, J. A. S. B., 1863, XXXII, p. 90.

*P. caudivolvulus*, Günther, Rept. Brit. Ind. p. 161, *nee* Pallas.

*P. Stoliczkaei*, Steindachner, Novara-Expedition, Reptilien, p. 23, Pl. I, Fig. 6, 7.

*P. caudivolvulus* and *P. Forsythi*, Anderson, P. Z. S., 1872, pp. 387, 390.

*Hab.* Ladák; Kuenluen; Eastern Turkestan; Sarikol.

After going through the various descriptions of *Lacerta caudivolvula* by Pallas, Eversmann, and Eichwald, and comparing their figures with the Tibetan species, I am satisfied that the form originally described by Pallas is different, and that it is probably one of the smooth species like *P. maculatus* and *P. axillaris*, both of which have a habit of coiling their tails, whilst *P. Theobaldi* has never been observed to do so. The markings on the tail in all *Phrynocephali* are very constant and those of the true *P. caudivolvulus* are different from those of *P. Theobaldi*. It is impossible to enter at length into this subject here, but in the full account of the species I shall give my reasons in full for changing the name.\*

Although the form called by Dr. Anderson *P. Forsythi* appears distinct at first and is, as a rule, differently coloured on the body, I can find no constant distinction from *P. Theobaldi*.

##### 6. *P. AXILLARIS*, sp. nov.

*P. major, lævis, cauda elongata, pede anteriore in adulto vix femur attingente, squamis omnibus lævibus, caudæ apicem versus exceptis; supra griseus, maculâ rubrâ utrinque post axillam notatus, membris caudaque fasciis fuscis transversis signatis, hac ad medium fusco-annulatâ, nunquam ad apicem nigrâ, subtus albidus. Long. tota poll. 5—6, caudæ  $\frac{2}{3}$  totius longitudinis subæquante.*

\* I should, however, mention that I think there is reason to doubt whether the specimens assigned to *P. caudivolvulus* in the Berlin Museum are rightly named. It was upon Dr. Peters's comparison of Tibetan specimens with the former that Dr. Günther based his identification. At all events, the characters of a specimen from the Berlin Museum described by Dumeril and Bibron differ from the original description given by Pallas.



*Hab.*—Eastern Turkestan, in the plains.

A large, rather long-tailed species, with the same structure as *P. maculatus* and the same habit of coiling its tail. It is distinguished, when adult, by its limbs being shorter and the toes less fringed, and by colouration. *P. axillaris* has a red spot behind each shoulder so as to be partly concealed by the fore limb when laid back and it never has the tip of the tail black whilst *P. maculatus* always has.

7. *TERATOSCINCUS KEYSERLINGII*.—Eastern Turkestan.

8. *GYMNODACTYLUS STOLICZKÆ*.

*Cyrtodactylus Yarkandensis*, Anderson. P. Z. S., 1872, p. 381.

*Hab.*—Ladák.

From an examination of Dr. Anderson's type specimen, I have ascertained that it is identical with the species previously described and figured by Steindachner (Rept. Nov. Exp. p. 15, Pl. II, fig. 2). I also think that Dr. Anderson must have been misinformed as to the original locality of the specimen he described, for the species abounds in Ladák, whilst it is replaced by other forms of the genus at Yárkand.

9. *G. ELONGATUS*, sp. nov.

*G. elongatus*, corpore gracili, caudâ attenuatâ, membris exilibus, dorso tuberculis majoribus latis confertis ornato, inter tuberculas squamis rotundis parvulis induto, caudâ subtus scutis majoribus instructâ, verticillatâ serie ultimâ verticilli cujusque ex squamis majoribus carinatis superne et ad latera omnino compositâ, poris præanalibus ad 5; griseus transverse fusco fasciatus. Long. poll. 5, caudæ 2.8.

*Hab.*—Yangihissar, Eastern Turkestan.

A peculiarly elongate form of the group of *G. Caspius*, distinguished from that and all allied species by its slenderness and by the peculiarity of the tail having no spinose tubercles, but only the last row of scales in each ring enlarged and carinate without any intervening small scales.

10. *G. MICROTIS*, sp. nov.

*G. parum robustus*, capite brevi, depresso, meatu auditorio minimo; caudâ attenuatâ, lævi, haud verticillatâ, membris breviusculis; dorso granulato, tuberculis subcarinatis ornato; arenarius, fusco minute punctatus, subtus albescens. Long. tota 3.2 poll., caudæ 1.8.

*Hab.*—Eastern Turkestan.

A small sandy coloured species with a smooth tail and the back tuberculated. It is remarkable for its very small ear-orifice. It appears to be a house-gecko and was found about old walls. It is probably allied to the species described by Pallas under the name of *Lacerta pipiens*, but that





is said by its describer to have all the back scales granular, and to be marked with angulate cross bands

11. EREMIAS YARKANDENSIS, sp. nov.

*E. cæruleo-ocellata*, Anderson, P. Z. S., 1872, p. 373, nec Dum. et Bib.

*E. gracilis*, supra grisea vel olivacea, nigro-maculata, ocellis albidis nigro marginatis utrinque ad dorsum in seriem longitudinalem dispositis; subtus albida; scutis nasalibus haud tumidis, præfrontali unico, a rostrali supranasalibus atque a verticali postfrontalibus longe disjuncto; infra-orbitali ad labrum pertinente; dentibus palatalibus nullis; scutis ventralibus in series longitudinales (potius obliquas) 14—16, et in transversas ad 30 dispositis; poris femoralibus utrinque 9—14, squamis infradigitalibus vix carinatis. Long. 6 poll., caudæ 3.7.

*Hab.*—Eastern Turkestan.

This species was referred by Dr. Anderson to *E. cæruleo-ocellata* of Dumeril and Bibron, but it appears to me to differ in having the nasal shields not swollen, the dorsal scales closer together, almost without intervening granules, and, I think, in being more slender. *E. cæruleo-ocellata* has the tail scales keeled; as a rule they are smooth in the basal portion in *E. Yarkandensis* but the character is not constant. This species appears more closely allied to *E. multiocellata* Günther and may perhaps be identical, but that form is described as having an azygos shield between the postfrontals, an enlarged shield in the middle of the collar, and 18 rows of scales across the belly. I scarcely think, too, that Dr. Günther would have omitted to mention the absence of tumidity in the nasal shields which distinguishes *E. Yarkandensis* from other forms of the genus.

11a. *E. YARKANDENSIS*, var. SATURATA.

*E. Yarkandensis* magis infuscata, scuto infra-orbitali diviso, parte superiori a labro discreto.

*Hab.*—Valleys of the Kuenlun range, south of Yarkand.

This differs from the type in having the infra-orbital shield divided, and in darker colour. Neither character, however, is quite constant, and there is one dark specimen with the infra-orbital undivided.

12. EREMIAS VERMICULATA, sp. nov.

*E. supra grisea*, nigro-vermiculata, subtus albida, elongata, gracilis; dorso granulosa, scutis nasalibus tumidis, præfrontali unico a rostrali supranasalibus atque a verticali postfrontalibus longe disjuncto; supra-orbitalibus convexis, omnino squamis minimis rotundis circumdatis; infra-orbitali late ad labrum pertinente, dentibus palatalibus nullis; scutis ventralibus in series 16—20 longitudinales (potius obliquas), atque 36—41 transversus dispositis; poris femoralibus utrinque 19—23; squamis infradigitalibus vix carinatis. Long. 7.4 poll., caudæ 5.1.





*Hab.*—Eastern Turkestan.

Allied to the last, but more slender with a longer tail and longer limbs. It has more numerous ventral scales and femoral pores, swollen nasal shields, the supraorbital disk surrounded by granules, and different colouration.

13. *EUMECES TENIOLATUS*.—Between Mari in the Panjáb and Kashmir.

A single specimen 13 inches long, stouter than the type, and with 23 rows of scales round the body.

14. *MOCOA HIMALAYANA*.—Mari, Panjáb; Kashmir.

15. *M. STOLICZKAI* (? = *M. Ladacensis*).

*Euprepes Stoliczkai* and *E. Kargilensis*, Steindachner, Novara Expedition, Reptilian, pp. 45, 46.

*Eumeces Ladacensis*, Anderson, P. Z. S., 1872, p. 375.

*Hab.*—Ladak.

I am unable to identify this species satisfactorily with *Eumeces Ladacensis*, Günther, because in not one out of the twenty-four specimens collected does the forefoot reach the end of the snout. Anderson also noticed this. Still I think it probable that the two are identical.\* *E. Kargilensis* was chiefly distinguished by Steindachner because of its having 4 instead of 5 supralabials before the infraorbital. In some specimens collected there are 4 on one side and 5 on the other.

#### OPHIDIA.

16. *TYPHLOPS PORRECTUS*?—Jhiam valley between Mari and Kashmir.

This appears stouter than the type and may be distinct. Only a single specimen was obtained.

17. *COMPSOSOMA HODGSONI*.—Kashmir.

18. *PTYAS MUCOSUS*.—Kashmir.

19. *ZAMENIS RAVERGIERI*.

*Colubus Ravergieri*, Men. Cat. Rais. p. 69, (1832).

*Zamenis caudolineatus* Günther, Cat. Col. Snakes, Brit. Mus., p. 104 (1858).

*Z. Ravergieri* and *Z. Fedtschenkoi*, Strauch, Schlangen des Russischen Reichs, Mem. Acad. Sci. St. Pet. XXI, No. 4, p. 127 (1873).

*Hab.*—Eastern Turkestan.

The colouration of the three specimens obtained is that of the variety called by Strauch *Z. Fedtschenkoi*, in which the tail is spotted instead of being striped. In describing the specimens found in Persia, I have shewn that the two forms pass into each other.

\* The locality of *E. Ladacensis*, Günth. Rept. Brit. Ind. p. 88, rests upon the authority of the Messrs. Schlagintweit, and consequently no reliance can be placed upon its accuracy.





20. *TROPIDONOTUS HYDRUS*.—Eastern Turkestan.
21. *T. PLATYCEPS*.—Mari and Kashmir.
22. *TAPHROMETOPUM LINEOLATUM*.—Eastern Turkestan.
23. *VIPERA OBTUSA*.

*V. Euphratica*, Martin, P. Z. S., 1838, p. 82.

*V. obtusa*, Dwigubsky, *teste* Strauch Mem. Acad. St. Pet. XXI, No. 4, p. 221.

24. *HALYS HIMALAYANUS*.—Mari and Kashmir.

### AMPHIBIA.

#### BATRACHIA.

1. *RANA CYANOPHLYCTIS*.—Between Mari and Kashmir.
2. *DIPLOPELMA CARNATICUM*.—Tináli between Mari and Kashmir.
3. *BUFO VIRIDIS*.—Kashmir ; Eastern Turkestan ; Wakhán.
4. *B. CALAMITA* ?—Kashmir.

### XVI.—*Notes on a few new Oaks from India.*—By S. KURZ.

(With Plate XIV.)

(Received Sept. 30th ;—Read Nov. 4th, 1875.)

Some time ago I received, through the kindness of Capt. J. Waterhouse, two acorns collected by Capt. W. G. Hughes, Deputy Commissioner of the hill-districts of Arracan. They were obtained in the hills of Arracan at some 5000 or 6000 ft. elevation and proved interesting, the one as being a full-grown acorn of *Quercus mespilifolia*, a species previously known only from Ava and Prome and which I have hitherto considered (see Flora, 1872, p. 398) to be only a variety of *Q. semiserrata*, but which I must now acknowledge as an entirely distinct species ; the other as being a young specimen of a new species of which a full-grown cluster of acorns from Assam exists in the Calcutta Herbarium. I have in vain tried to obtain either flowers or leaves of this species from the Khasya Hills, and, consequently, am compelled to name and describe it solely from the fruit. I have to do the same in the case of *Q. olla*, another new species from Assam. The figures, however, will, I hope, assist in their future identification. I take this opportunity of giving descriptions of a few other new species collected by myself and others in the Sikkim Himalaya and Burma.

1. *QUERCUS XYLOCARPUS*, nov. sp., Pl. XIV, Figs. 5—8.

Fructus per 2—3 in massam irregulariter obovoideam 1—2 poll. in diametro connati ; nuces apice tantum liberæ, depresso-globosæ, læves ; cupulæ dum immaturæ nuces omnino includentes demum circulariter apertæ et nucis





apicem exponentes, grosse et irregulariter lignoso-muricatæ, glabræ, tuberculis (resp. squamis) brevi-conicis obtusiusculis lineam circiter longis marginem versus minoribus et obsolete multiseriatis oblectæ.

HAB.—Arracan Yomah, east of Akyab, at 4000 to 5000 feet elevation ; Assam. (Hughes).

2. *QUERCUS OLLA*, nov. sp., Plate XIV, Fig. 9.

Rami adulti læves, nigri ; spica fructifera c. 4 pollicaris, robusta ; cupulæ liberæ cum 1—2 parvis abortivis basi adnatis, subturbinatæ, poll. in diametro et circiter  $\frac{1}{2}$  poll. altæ, crassissimæ, fulvello-tomentellæ, squamis numerosissimis latissimis atque breviter et abrupte acuminatis multiseriatis obductæ ; glans depresso-globosa e cupulâ vix exserta, lævis, nitens, subcapitato-mucronata.

HAB.—Assam (Jenkins).

3. *QUERCUS PACHYPHYLLA*, nov. sp., Plate XIV, Figs. 1—4.

Arbor 50—60-pedalis, glabra, ramulis nigris, gemmis glabris ; folia oblongo-lanceolata, petiolo crasso 2—3 lin. longo suffulta, longe et magis minusve abrupte acuminata, basi inæquali acuta, crasse coriacea, 3—5 poll. longa, costa nervisque circiter 8 utrinque supra impressis subtusque crasse prominentibus percursa ; spicæ femineæ crassæ, pruinose, 3—4 poll. longæ ; flores feminei 2—4- (vulgo 3-) ni ; perigonium brunneo-squamatum villosulum ; stigmata 3, raro 4, crasse linearia, lin. fere longa, erecto-patentia ; pedunculus fructigerus crassus, 2—4 poll. longus ; cupulæ maturæ 1—1 $\frac{1}{2}$  poll. in diametro, crasse coriaceæ, cinereo- v. subgilvo-tomentellæ, squamis lato-ovato-trigonis acutis crassis in series circiter 9—12 indistincte annulatim dispositis, vulgo per 2—3 et plures in massam magis minusve confluentes ; glans pollicem circiter lata, depressiuscule hemispherica, bene evoluta e cupulâ fere semiexserta, glabra, nitida, in glomeribus nondum evolutis minus exserta.

HAB.—Frequent in the hill-forests of the Tongloo and Phalloot mountains at 7—8000 ft. elevation (collected also by G. Mann, S. Gamble, etc.)

This species as well as the two foregoing all belong in the vicinity of *Quercus spicata*. *Q. pachyphylla* very much resembles *Q. squamata*, Roxb., a species which in my opinion is incorrectly referred as a synonym to *Q. spicata*.

4. *QUERCUS FALCONERI*, nov. sp.

Arbor glabra ; folia iis *Goniothalami sesquipedalis* simillima, elongato-oblonga, 1 $\frac{1}{2}$ —1 ped. longa, basi acuta, petiolo crasso glabro 3—4 lineali suffulta, breviter acuminata v. apiculata, tenuiter coriacea, utrinque lucida, glabra, nervis numerosis (circiter 20 utrinque) supra impressis, subtus prominentibus,



reticulatione satis obsoletâ; spicæ fructigeræ  $1\frac{1}{2}$  ped. circiter longæ, tomentellæ, glandes obovoideo-globosæ, pollicem fere latae, læves, styloso-apiculatæ, pallide brunneæ et nitidæ, exsertæ; cupulæ concavo-explanatæ, marginibus plus minusve revolutis, crasse coriaceæ, extus ferrugineo-velutinæ, intus canescenti-sericeæ, liberæ v. rarius basi tantum connatæ, squamis numerosis triangularibus parvis appressis obductæ.

HAB.—Upper Assam (Falconer). Very nearly allied to *Q. Amherstiana*, Wall.

#### 5. *CASTANEA DIVERSIFOLIA*, nov. sp.

Arbor 40—60-pedalis, novellis fulvo-pubescentibus; folia valde variabilia, novella chartacea, ovato-oblonga ad ovata, 7—9 poll. longa et 4— $4\frac{1}{2}$  poll. lata, petiolo semipollicari pubescenti suffulta, in nervis utrinque parum pubescentia, nervis reticulatione laxâ crassâ et conspicuâ; adulta multo minora, coriacea, elliptico-oblonga, breviter et obtuse acuminata,  $4\frac{1}{2}$ —6 poll. longa, utrinque pagina v. petiolo et in nervis utrinque puberula et glabrescentia, squamis minutis argenteis destituta; paniculæ magnæ et robustæ, apicibus ramulorum congregatæ dense fulvo v. cinereo-tomentosæ; fructus involucrium  $1\frac{1}{2}$  poll. fere in diametro, spinis obtectum; spinæ simplices, strictæ, pubescentes, circa 4 lin. longæ.

HAB.—Common in the drier hill forests of Martaban, at 3,500—5000 ft. elevation.

I describe this species as a *Castanea* connecting *Castanopsis* (including *Lithocarpus*) with *Castanea*. This, of course, is quite a practical division for the differences between all these genera are simply artificial ones.

#### EXPLANATION OF PLATE XIV.

Figs. 1—4. *Quercus pachyphylla*, Kurz. Fig. 1, fruiting spike; fig. 2, leaf-branch; fig. 3, female inflorescence; fig. 4, female flowers, somewhat magnified.

Figs. 5—8. *Quercus xylocarpa*, Kurz. Figs. 5 and 6, ripe fruit clusters, from above and from below; fig. 7, unripe, ditto, from Arracan; fig. 8, scales, somewhat magnified.

Fig. 9. *Quercus olla*, Kurz. Acorns, from the side and from above; natural size.

#### XVII.—*On a new Species of Tupistra from Tenasserim*.—By S. KURZ.

(Received Sept. 30th;—Read Nov. 4th, 1875.)

From amongst the many fine plants which I owe to the late Dr. F. Stoliczka I have selected for description this new species of *Tupistra*, a genus that has hitherto been supposed to be monotypic. The present species is remarkable for its stiff robust erect spikes, those of *T. nutans* being short,





comparatively slender, and so much decurved that the fruits when ripe are usually buried in the mould of the dark forests in which the plant grows.

Baker, in his Revision of *Asparagæ* (Journ. Linn. Soc., XIV. 581), adds a doubtful species (*T. ? Singapuriana*, Wall.) to the genus. Of this I have seen only a very bad specimen without fruit or flower, but to me it appears a *Hypoxidea* or more likely a species of *Apostasia*. The same author makes *Veratonia*, Miq., a *Palmacea* (from which the fleshy scanty albumen would alone remove it), having evidently overlooked a little note of mine on this genus in the Flora, 1873, p. 224, where I have identified the plant with *Susum anthelminticum* of Blume. In this note I have inadvertently overlooked *Susum minus*, Miq. Suppl. Fl. Sumatr. 598, which should be added as a synonym to *S. Kassintu*, Kurz.

TUPISTRA STOLICZKANA, nov. sp.

Herba perennis 3—4-pedalis, glabra; folia iis *T. nutantis* similia sed multo majora et latiora, lanceolata, utrinque acuminata, in petiolum 1—1½ pedalem complicatum membranaceo-marginatum decurrentia, 2½—3 ped. longa, 4—5 poll. lata, chartacea; spicæ radicales, circ. 1 ped. altæ, strictæ erectæ, robustæ, pedunculo c. 4 pollicari suffultæ, glabræ; flores sessiles, mediocres, ½—¾ poll. in diametro, bractea latissimâ cucullatâ obtusâ infractâ sustenti; corolla 6-loba, tubus urceolato-campanulatus, limbi lacinise linearilanceolatæ c. 3 lin. longæ, obtusiusculæ, basi ad faucem antheram sessilem oblongam utrinque truncatam 2-locularem gerentes; ovarium ovoideum, 3-loculare; stylus sulcatus, crassus, circ. 1 lin. longus; stigma magnum, convexo-peltatum, lobatum, scabrum; baccæ valde immaturæ ovoideo-globosæ, cerasi magnitudinis.

HAB.—Upper Tenasserim, Moulmein District (Dr. F. Stoliczka).

XVIII.—*Descriptions of new Indian Plants.*—By S. KURZ.

(With Plate XV.)

(Received Sept. 30th;—Read Nov. 4th, 1875.)

1. ZANTHOXYLON ANDAMANICUM, nov. sp.

Frutex semiscandens, aculeis sparsis subcurvis brevibus armatus, novellis parce pubescentibus; folia imparipinnata, 2—4 poll. longa, petiolo inermi anguste alato; foliola 3—4-juga cum impari, subsessilia, inæquali-rhomboidæ (terminali cuneato-obovato), ½—1 poll. longa, obtusa, membranacea, margine exteriori salvo apicem versus integra, secus interiorem grosse crenata, subtus in costâ parce pubescentia; cætera ignota.—*Andamans.*

2. AGLAIA PANICULATA, nov. sp.

Arbor mediocris, sempervirens, novellis dense fulvo- v. cupreo-lepidotopuberulis mox glabrescentibus; folia impari-pinnata, glabra, rhachi terete



cupreo-lepidotula glabrescente; foliola vulgo 2-juga cum impari, subopposita, ovata ad ovato-oblonga, petiolulo ferrugineo-lepidoto 2—2½ lineali suffulta, 4—9 poll. longa, coriacea, glabra, opaca, foliolis summis ternatis v. pinnato-remotis; flores minuti, pedicellis gracilibus brevibus ferrugineo-lepidotis, in paniculas amplas ferrugineo-lepidoto-tomentosas axillares foliorum longitudine v. paullo breviores dispositi; calyx ferrugineo-lepidotus, lobis latis obtusis; petala semilineam longa, libera; antheræ 5; baccæ ignotæ.—*Pegu; Tenasserim.*

### 3. AMOORA LACTESCENS, nov. sp.

Arbor sempervirens, usque 40-pedalis, novellis pallide lepidotis, succo lacteo scatens; folia impari-pinnata, rhachi terete, lepidotula, mox glabrescentia; foliola 3—2-juga cum impari, alterna, oblonga ad lanceolato-oblonga, petiolulis 2—3 lin. longis suffulta, basi acutâ obliqua, acuminata, chartacea, viridia, glabra, 3—5 poll. longa, nervis venisque supra bene conspicuis; flores majusculi, pedicellis curvis argenteo-lepidotis 1—1½ lin. longis suffulti, paniculam axillarem petiolo breviorē laxam sessilem gracilem parce ramosam dense lepidotam efformantes; calyx dense lepidotus; petala 3, lineam circiter longa v. paullo longiora, concavo-rotundata, glabra; antheræ 6; fructus obovoideo-globosi, juniores furfuraceo-lepidoti, cerasi magnitudine.—*Martaban.*

### 4. AMOORA DYSOXYLOIDES, nov. sp.

Arbor sempervirens, mediocris, novellis cinereo-lepidotis; folia impari-pinnata, pedem circiter longa, rachi petiolo et costâ subtus dense canescenti-lepidotis; foliola 3-juga cum impari, alterna, oblonga, basi oblique acuta, petiolulis 2—3 lin. longis lepidotis suffulta, subabrupte et obtusiuscule acuminata, tenuiter coriacea, nigrescentia, opaca, subtus sparse et minute argenteo-lepidota; flores parvi, pedicellis brevibus crassis lepidotis suffulta, in paniculam axillarem parvam petiolo multo breviorē dense canescenti-v. gilvo-lepidotam sessilem disgesti; calyx brevis, dense lepidotus, 5-dentatus; petala 5, lineam vix longa, obovato-oblonga, glabra; tubus stamineus glaber; antheræ 10; ovarium ovoideum, pallide hirsutum; stigma sessile, magnum, glabrum.—*Martaban.*

### 5. WALSURA OXYCARPA, nov. sp.

Arbor, gemmis fulvescenti-puberulis; folia impari-pinnata, petiolo rachique sparse lenticellatis glabris gracilibus; foliola bijuga cum impari, petiolulis ½—¾ pollicaribus gracilibus suffulta, lanceolata ad oblongo-lanceolata, 3—4½ poll. longa, tenuiter chartacea, longiuscule acuminata, subtus glaucescentia reticulatione tenuissimâ et inconspicuâ percursa; paniculæ fructigeræ gracillimæ et longe pedunculatæ, parce ramosæ, glabræ, foliis breviores; baccæ immaturæ ovato-oblongæ, acuminatæ, ½ poll. longæ, cinereo-velutinæ.—*Andamans.*



DAPHNIPHYLLOPSIS, nov. gen. *Olacinearum*.

Pl. XV, Figs. 1—7.

Calyx 5-lobulatus, accrescens. Petala 5, raro 6—7, cum ovario connata, libera. Stamina perfecta 10, irregulariter v. alternatim longiora. Ovarium inferum, pedicelliforme, disco epigyno majusculo annulari coronatum; stylus perbrevis, simplex. Fructus cum calyce aucto connatus, disco epigyno et calycis lobulis coronatus.—Arbor magna, foliis simplicibus integris. Flores parvi, sessiles, in capitula pedunculata axillaria congesti.

6. *D. CAPITATA*, (*Ilex daphniphyllodes*, Kurz in Journ. As. Soc. Beng. 1870—72).

*Descriptioni adde:* Flores non pedicellati, sed cum ovario pedicelliformi sessiles; ovarium inferum, cum calyce connatum, parce pubescens, apice disco epigyno glabro crasso annulari obscure lobato terminatum; baccæ immaturæ obovoideæ, c. 3 lin. longæ, parce pubescentes.—*Montes Himalayæ Sikkimensis et Martabanæ, 5—7000 ped. s. m.*

NATSLATOPSIS, nov. gen. *Olacinearum*.

Pl. XV, Figs. 8—9.

Flores fertiles ignoti; masculi: calyx 4-fidus, parvus. Corolla tubulosa, apice 4-loba. Stamina 4, libera, cum corollæ lobis alterna; filamenta longa, lata; antheræ lineari-oblongæ. Ovarii rudimentum dense hispidum.—Herba perennis, volubilis, scabra, foliis alternis cordato-ovatis palmatinerviis. Flores in spicas vulgo geminas axillares graciles dispositi; bractæ deciduæ.

7. *N. THUNBERGLEFOLIA*, nov. sp.

Herba perennis, volubilis, scabro-puberula; folia cordato-ovata v. oblonga, 5—6 poll. longa, petiolis 2—2½ poll. longis suffulta, breviter acuminata, supra scabra, subtus dense pubescentia, a basi 7-nervia; flores masculi brevissime pedicellati, 2 lin. circiter longi, in spicas ternas v. saepius geminas axillares laxas elongatas tomentellas disgesti; calyx parvus, 4-fidus, pubescens; corolla gamopetala, tubulosa, extus appresse pubescens, 4-loba, lobis brevibus reflexis; stamina 4, cum corollæ lobis alterna, filamenta libera, lato-linearum; ovarii rudimentum hemisphericum, dense fulvo-hispidum.—*Avæ.*

8. *MIQUELIA CANCELLATA*, nov. sp.

Frutex volubilis, ramis tortuoso-striatis; folia oblongo-lanceolata, basi attenuata, petiolo circiter pollicari suffulta, 4—5 poll. longa, acuminata, rigide coriacea, lucida, subtus exigue puberula glabrescentia nervis et reticulatione crassis prominentibus percursa; drupæ (pericarpio deprivatæ) obovato-oblongæ, margines versus compressiusculæ, pollicem circiter longæ, elegan-



tissime at grosse cancellatæ; semen solitarium, endocarpio crustaceo conforme sed minus, cancellato-nervosum, pendulum. *Malacca* (Maingay No. 376).

Descriptio e specimine valde fragmentario confecta.

9. *ILEX SIKKIMENSIS*, nov. sp.

Arbor mediocris, glabra, ramis crassis, gemmis ample squamatis; squamæ lato-ovales, obtusissimæ, c.  $\frac{1}{2}$  poll. longæ, glabræ, lato scarioso-marginatæ; folia larga, oblonga, basi in petiolum  $\frac{1}{2}$ —1 pollicarem crassum attenuata, obtusiuscula, 5—6 poll. longa, repando-serrulata, coriacea, glabra; cymæ fructiferæ densæ, breves, robustæ, e perulis axillaribus v. supra foliorum cicatricibus ortæ, glabræ; baccæ globosæ, piperis grani magnitudine, læves, lutæ, pedicellis strictis c. 3 lin. longis suffultæ, stigmatе sessili peltato-4-lobo coronatæ, 4-pyrenæ; pyrenæ trigonæ cum dorso convexo sublæves.—*In sylvis montanis subtemperatis Himalayæ Sikkimensis*, alt. 7—10000 ped. s. m. Fr. Oct.

Aff. *I. odorata*, gemmis maximis et drupis luteis 4-pyrenis jam distincta.

10. *GYMNOSPORIA THOMSONI*, nov. sp.

Arborea, glabra, spinis nudis rectis armata, ramulis lenticellatis; folia lanceolata ad oblonga-lanceolata, petiolo gracili 2—3 lin. longo suffulta, 2—5 poll. longa, tenuiter acuminata, crenato-serrulata, membranacea, glabra, in sicco fuscescentia v. nigrescentia; flores parvi, 5-meri, pedicellis gracillimis 1—2 linealibus, cymas a basi fasciculato-ramosas pollice vix longiores axillares v. supra foliorum delapsorum axillis ortas efformantes; petala lin. circiter longa; capsulæ pisi majoris magnitudine, lato-obovatæ, acutiusculæ, læves, vulgo ultra medium bivalvato-dehiscentes, 2—1-loculares et 2—1-spermæ.—*Sikkim Himalaya* alt. 2—5000 ped. s. m.; *Bootan*, montes *Dewan-garee* (Masters) Fl. Apr. Fr. Sept. Oct.

Sub eodem nomine cum *Celastro monosperma* ex herb. Kewensi distributa.

11. *GYMNOSPORIA GIBSONI*, nov. sp.

Frutex spinis crassis rectiusculis longis foliis et florigeris, armatus, novellis puberulis; folia obovata, petiolo 1—1 $\frac{1}{2}$  lin. longo suffulta, apiculata ad obtusa, 1—2 $\frac{1}{2}$  poll. longa, obsolete crenata, membranacea, in sicco brunnescentia, subtus puberula, supra glabra; cymæ fructigeræ folio paullum breviores, e spinis v. earum axillis ortæ, puberulæ, glabrescentes, graciles, pedunculatæ, dichotomo-ramosæ; capsulæ immaturæ glabræ, obpyriformes, vulgo 3-lobatæ et 3-loculares,  $\frac{1}{2}$  poll. longæ, 3-valvatæ, oculis monospermis.—*Bombay Presidency* (Dr. Gibson).

12. *LOPHOPETALUM FUSCESCENS*, nov. sp.

Arbor glabra; folia oblonga, petiolo 1—1 $\frac{1}{2}$  pollicari suffulta, breviter acuminata, basi obtusa, integra, 4—8 poll. longa, coriacea, opaca, subtus





rubido-fuscescentia, nervis confertiusculis 14—16 utrinque; cymæ rigidæ, brachiatae, in paniculam terminalem glabram consociatae; pedunculi  $1\frac{1}{2}$ —2 poll. longi, ramuli ultimi breves compresse 4-goni; flores parviusculi, pedicellis gracilibus lineam circiter longis suffulti, confertiusculi; calycis lobi breves, lati, rotundati; petala ovata, obtusiuscula, lin. longa, coriacea, margine lato membranaceo in alabastro induplicato aucta, cæterum nuda, in sicco in centro elongato-trigono-corrugata; discus indistincte 5-lobulus, in sicco rugulosus; stamina 5; filamenta longiuscula.—*Singapore.*

13. *SALACIA JENKINSII*, nov. sp.

Scandens?, glabra; folia petiolo 2—3 lin. longo suffulta, oblonga ad elliptico-oblonga, 5—7 poll. longa, apiculata v. abrupte et obtuse acuminata, basi obtusa v. rotundata, obsolete crenata, chartacea, glabra; flores majusculi, pedicellis c.  $\frac{1}{2}$  pollicaribus suffulti, cymas dichotomas glabras in paniculam elongatam terminalem v. in summorum foliorum axillis sitam dispositam formantes; sepala lato-ovata,  $\frac{1}{2}$  lin. longa, glabra; petala imbricata, obovata, obtusa, lineam longa v. longiora, glabra; stamina 3; filamenta subulata, lata, plana, recurva,  $\frac{1}{2}$  lin. longa; discus urceolatus, ovarium fere totum includens.—*Assam* (Jenkins).

14. *SALACIA PLATYPHYLLA*, nov. sp.

Frutex alte scandens, glaber; folia ovalia v. elliptico-ovalia, petiolo  $\frac{3}{4}$ — $\frac{1}{2}$  pollicari suffulta, obtusiuscule acuminata v. rarius apiculata, basi rotundata, integra coriacea, 4—6 poll. longa, opaca; flores majusculi, viridiusculi, pedicellis circa semipollicaribus lævibus crassiusculis suffulta, per plures e tuberculis axillaribus v. supra foliorum delapsorum cicatricibus orti; calycis lobi brevissimi et latissimi, integri, glabri; petala subvalvata, obovata,  $1\frac{1}{2}$  lin. longa, glaberrima; discus magnus et crassus, glaber; stamina 3; antheræ minutæ; filamenta plana, deorsum latiora, reflexa, in floribus sterilibus (?) lineam fere longa, in floribus fertilibus valde abbreviata; baccæ magis minusve globosæ, cerasi maximi magnitudine, coccineæ, læves, 2-spermæ; semina semi-convexiuscula,  $\frac{1}{4}$  poll. longa, obsolete et grosse rugosa.—*Nicobars.*

Ex affinitate *S. reticulatæ*.

15. *HIPPOCRATEA NICOBARICA*, nov. sp.

Frutex alte scandens, glaberrima ramulis sparse et minute lenticellatis; folia petiolo 3—4 lin. longo crasso suffulta, elliptica ad elliptico-oblonga, 5—6 poll. longa, basi obtusa, obtuse repanda, apiculata, coriacea, nitida, glauca; flores lutescentes, parvi, pedicellis  $2\frac{1}{2}$ —3 lin. longis suffulti, in cymas dichotomo-ramosas pedunculatas vulgo ternas terminales dispositi; bracteæ et bracteolæ minutæ, acutæ; calycis lobi parvi, ovati, acuti, ciliati; petala rotundata, imbricata,  $\frac{1}{2}$  lin. vix longa; discus convexus in marginem planum 5-gonum explanatus, ovarium fere totum includens; stamina 3, parva, subsessilia.—*Nicobars.*



16. *VITIS COSTATA*, Wall.

Humilis, prostrata v. scandens, ramulis 6-gonis, junioribus parce appresse hirsutis; folia simplicia, petiolo brevi 1—2½ lin. longo suffulta, ovato-v. subcordato-lanceolata, acuminata, repandocrenulata, basi rotundata v. subcordata, succoso-membranacea, concoloria, 4—6 poll. longa, subtus in nervis rectis parallelis prominentibus parce appresse hirsuta; flores . . . ., in cymas parvas strictiusculas oppositifolias v. in ramulorum extremitatibus paniculatim dispositas collecti; pedunculus circ. ½ pollicaris et ramificationes strictiusculi, juniores appresse hirsutuli; baccæ piperis grani magnitudine, pedicello subnutante 2—3 lineari sursum incrassato suffultæ, obovoideæ.—*Pegu; Martaban; Prome.*

17. *V. NEUROSA*, nov. sp.

Scandens, lignosa, glaberrima; cirrhi firmi, simplices?, oppositifolii; folia digitato-5-foliolata, glaberrima, etiam in sicco glauco-viridia, petiolo 2—3 pollicari suffulta; foliola oblonga, lateralia obliqua, petiolulis crassis 3—5 lin. longis suffulta, basi obtusa v. acuta, irregulariter et grossiuscule serrata, obtusiuscule acuminata, 3—4 poll. longa, coriacea, nervis et reticulatione utrinque (subtus magis) conspicua; flores parviusculi, cymulosi, pedicellis 2—3 linealibus suffulti; cymulæ elongato-pedunculatæ, cymam iterato umbellatam glabram pedunculo circiter 2 pollicari basi bracteato axillari suffultam efficientes; calyx truncatus; ovarium ovoideum, in stylum crassum apice patenter 4-lobum attenuatum; baccæ oblongæ, ½ poll. longæ, glabræ, 1—3 spermæ; semina oblonga, v. si 2 v. 3, semi-v. trigono-oblongæ, 4—6 lin. longæ, dorso leviter longitudinaliter depressæ.—*Khasya montes, alt. 3—4000 ped. s. m. (Vitis No. 44, Hf. and Th.).*

18. *V. VICARYANA*, nov. sp.

Gracilis, glabra; folia tripinnatisecta ad ternatisecta, 2—3 poll. longa, pinnæ inferiores vulgo 5- superiora 3-foliolata; foliola petiolulis capillaribus ½ lin. vix longis (terminali petiolulo usque ad ½ poll. longo) suffulta, parva, ½—¾ pollicaria, ovata ad lato-ovata, grosse crenato-repanda, acuta, rigide chartacea, glabra, in sicco supra nigrescentia subtus fuscescentia; paniculæ furcato-cymosæ, oppositifoliæ, pedunculo pollicari suffultæ; flores etc. omnes delapsi.—*Deyrah Dhoon (Capt. Vicary, 1833).*

Species elegantissima ex affinitate *V. Cantonensis*.

19. *SAPINDUS TOMENTOSUS*, nov. sp.

Arbor? pubescens, habitu *Erioglossi* etc.; folia paripinnata cum rhachi et petiolulis tomentella; foliola 4—3-juga, 4—5 poll. longa, 2—3 poll. lata, inæquali ovato-oblonga, basi inæquali acuta, breviter petiolulata, acuminata v. acuta, integra, chartacea, supra nervis puberulis exceptis glabra, subtus dense tomentella; panicula tomentella, terminalis; sepala oblongo-lanceolata,



acuta, extus pubescentia; petala elongato-cuneata, basin versus villosula; lamina obovata medio squamâ bifidâ intus dense lanuginosâ aucta; filamenta longe pilosa; stylus sub fructu juvenili simplex, continuus; drupæ immaturæ pedunculatæ, bilobæ, lobo altero abortivo, stylo acuminatæ, monospermæ, basi intus dense lanuginosæ, monospermæ; semen erectum; radícula linearis, recta.—*Ava, montes Khakhyen.*

20. *SAPINDUS MICROCARPUS*, nov. sp.

Frutex v. arbor?, ramulis novellis parce hirsutis; folia bifoliolata, petiolo 1—2 lin. tantum longo parce hirsuto glabrescente suffulta; foliola oblonga ad lineari-oblonga, basi obliquâ acuminata, 2—3½ poll. longa, obtusiuscula v. subretusa, integra, coriacea, glabra utrinque prominenter reticulata; flores parvi, glabri, pedicellis ½ lin. longis suffulti, paniculas subsessiles graciles pubescentes mox glabras terminales et axillares efformantes; baccæ vulgo profunde 2-lobæ v. abortu unilobæ, lobis obovatis divergentibus 1½—2 lin. longis glabris.—*Siam.* (Teysmana).

21. *POMETIA MACROCARPA*, nov. sp.

Arborea, glaberrima; folia pinnata, longa; foliola inferiora tantum adsunt inæquali oblongo-lanceolata, basi rotundata, brevissime et crasse petiolulata, acuminata, 3—4 poll. longa, remote et obsolete repanda, coriacea, supra lucida, nervis lateralibus numerosis crassis in pagina superiori immersis percursa; flores parvi, pedicellis capillaribus glabris c. 2 lin. longis suffulti, fasciculati, fasciculi racemosi in paniculas crassas subglabras collecti; calycis lobi minute ciliolati, glabri; stamina 5; ovarium parce hirsutum glabrescens; baccæ corticatæ, ellipsoideæ, ovi gallinacei magnitudine, glaberrimæ, monospermæ, cortice crasso; semen ovoideo-oblongum, ultra pollicem longum, basi breviter arillatum.—*Malacca* (Maingay No. 413).

22. *DALBERGIA STENOCARPA*, nov. sp.

Arbuscula, novellis aureo- v. fulvo-sericeis; folia pinnata, breviuscule petiolata, 5—8 poll. longa; foliola 9—13, alterna, elliptico-oblonga ad elliptica, petiolulo 1½—2 lin. longo sericeo-puberulo suffulta, basi subobliqua acuta, 1—1½ poll. longa, retusa cum mucrone minuto, chartacea, subtus glaucescentia et parce (præcipue secus nervos) pilosula; paniculæ fructigeræ puberulæ, pedunculo circa pollicari suffultæ, axillares, folio multo breviores; flores..., pedicelli 1 lin. circiter longi, puberuli; calyx 1 lin. longus, appresse fulvo-hirsutus, dente superiore brevissimo obtuso, infimo longissimo subulato; legumina 1—2 poll. longo et circa 2 lin. lata, linearia, in stipitem longum gracilem sensim attenuata, plana, brunnea, tenuiter coriacea, obtusa v. stylo terminata, laxè et indistincte venosa, 1—5-sperma, suturâ exteriori vulgo rectâ interiore sinuosâ v. leviter curvatâ.—*Sikkim, Pankabâri* (S. Gamble). Fr. Aug.

Leguminum structurâ et indole ad *D. Sissoo*, ex habitu autem ad *Dalbergiam lanceolariam* accedens.



23. *FRAGARIA SIKKIMENSIS*, nov. sp.

Perennis, estolonifera, acaulis, rhizomate crasso verticali v. obliquo; folia trifoliolata, petiolo parce piloso 2—3 pollicari suffulta; foliola elliptica ad obovato-elliptica, lateralia subobliqua, grosse crenato-serrata, obtusa,  $\frac{1}{2}$ —1 poll. longa, brevissime petiolulata, crasse membranacea, utrinque pilis sparsis albis rigidis adspersa; scapi solitarii foliis paullulo breviores, uniflori, parce pilosi; calycis lobi 10, spatulato-obovati, acuti, alterni breviores et angustiores, nervosæ, apicem versus dentati, 2—3 lin. longi, parce pilosi v. subglabræ, piloso-ciliati; cænanthium cylindrico-oblongum, glabrum,  $\frac{1}{2}$  poll. longum. *Sikkim-Himalaya*, in pascuis alpinis 10—15000 ped. s. m.

24. *RUBUS FOCKEANUS*, nov. sp.

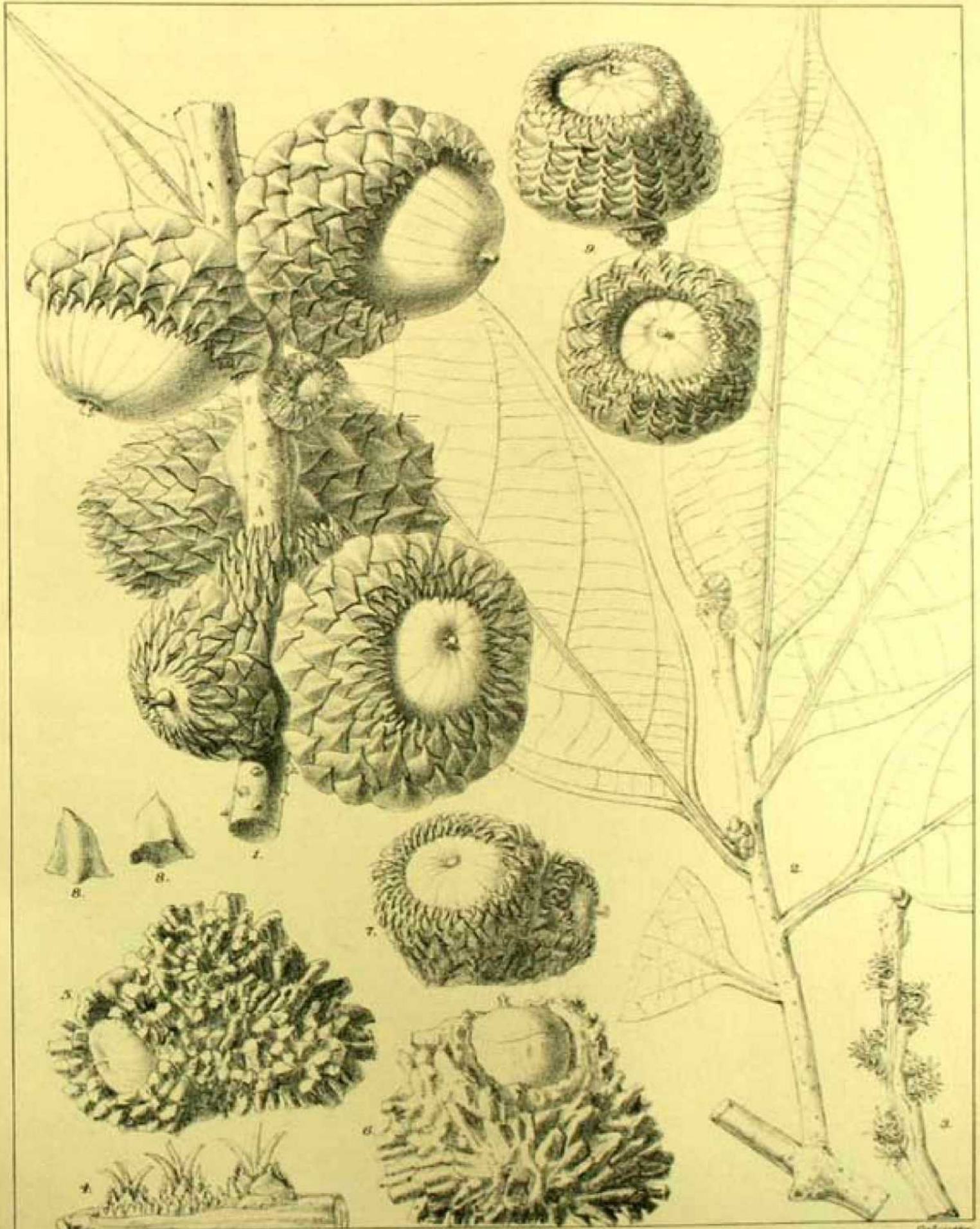
Prostratus et longe repens, caulibus filiformibus parce hirsutis surculosis; folia trifoliolata, iis *Fragariæ* haud absimilia, petiolo 1—2 pollicari parce piloso suffulta; foliola ovalia ad rotundato-ovalia, breviter petiolulata, obtusa,  $\frac{1}{2}$ —1 poll. longa, irregulariter duplicato-serrata, subplicata, secus nervos parce appresse hispidula, lateralia obliqua; flores solitarii, ramulos breves annuos unifoliolatos terminantes, pedunculo villosulo parce et minute glandulo-hispido poll. fere longo suffulti, majusculi; calycis laciniæ ovatæ, acuminatæ, 3 lin. circiter longæ, extus subglabræ, intus tomentellæ; stamina glabra, erecta?; drupeolæ perpaucæ, 1— $\frac{1}{2}$  lin. longæ, coccineæ, lucidæ. In pascuis alpinis, *Sikkim-Himalaya*, e. g. in jugis Singalilah, 12—14000 ped. s. m.

## EXPLANATION OF PLATE XV.

Figs. 1—7. *Daphniphyllopsis capitata*, Kurz.—Fig. 1, flowering branch, nat. size; fig. 2, flower, the petals removed; fig. 3, flower, from below; fig. 4, the same from above; fig. 5, fruiting inflorescence, nat. size; fig. 6, berry, nat. size; fig. 7, upper part of berry, shewing the persistent crown formed by the calyx-limb and epigynous disk.

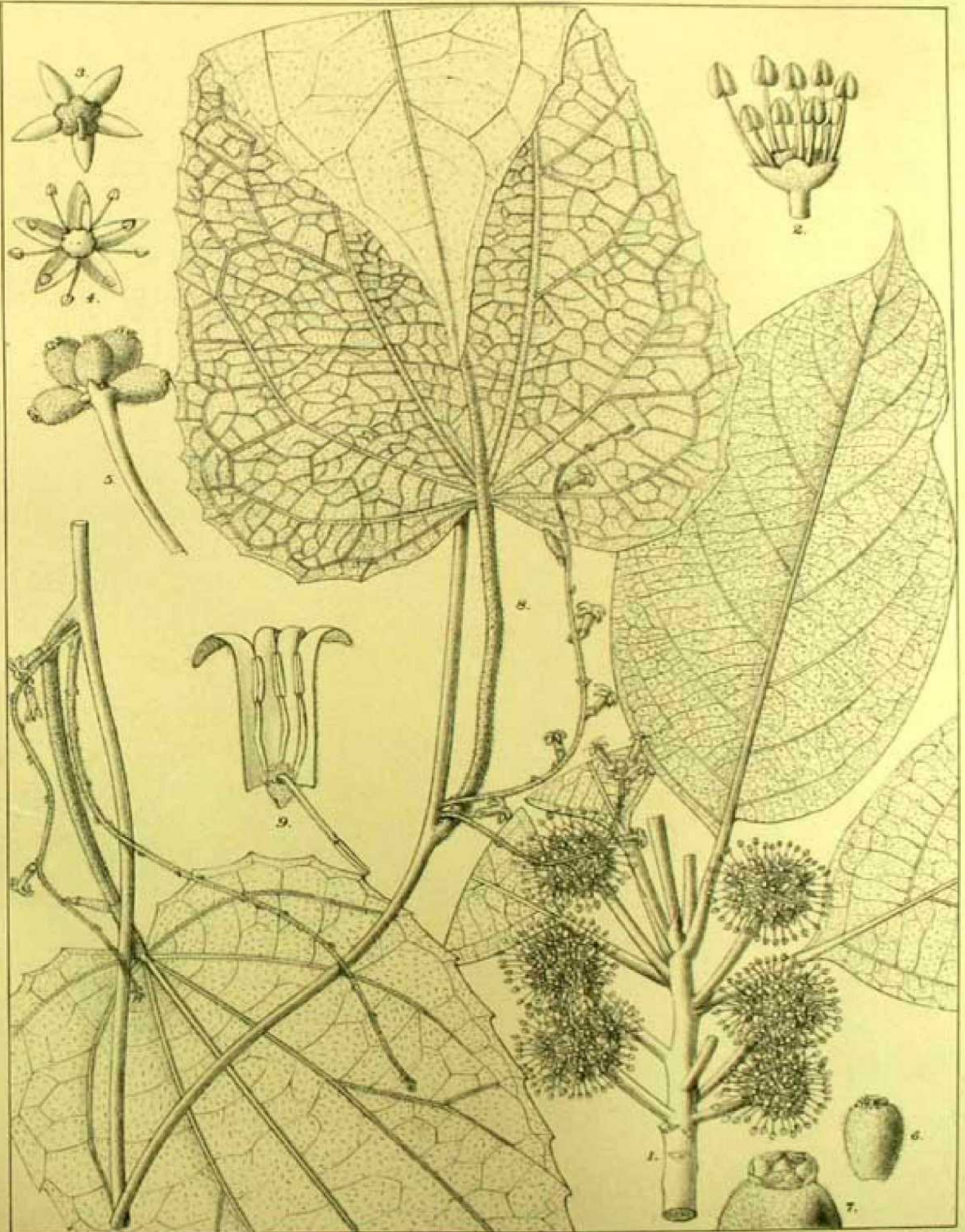
Figs. 8—9. *Natsiatopsis thunbergiaefolia*, Kurz.—Fig. 8, flowering branch, nat. size; fig. 9, flower, with opened corolla, shewing stamens and ovary-rudiment.





1-4 QUERCUS PACHYPHYLLA. 5-8. Q. XYLOCARPA. 9. Q. OLLA.





S. Sedykhed, Lith.

Calcutta.

1-7. DAPHNIPHYLOPSIS CAPITATA.  
8-9. NATSIATOPSIS THUNBERGIAEFOLIA.





Yours ever most truly,  
E. A. Blyth





JOURNAL  
OF THE  
ASIATIC SOCIETY OF BENGAL.

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PART II. EXTRA NUMBER. AUGUST, 1875.

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CATALOGUE OF  
MAMMALS AND BIRDS  
OF BURMA.

BY THE LATE  
E. BLYTH,

C.M.Z.S.; HON. M.B.O.U.; HON. M. ASIAT. SOC. BENGAL; CORR. M. ROY. ACADEMY  
OF TURIN, OF ROY. NORWEGIAN, AND OF BATAVIAN SOCIETY OF SCIENCES;  
CORR. M. ACAD. NAT. SCIENCES OF PHILADELPHIA, AND NAT.  
HIST. SOC. OF THE MOSELLE DEPARTMENT.

WITH A MEMOIR, AND PORTRAIT OF THE AUTHOR.



HERTFORD:  
PRINTED BY STEPHEN AUSTIN AND SONS.  
1875.



HERTFORD:

PRINTED BY STEPHEN AUSTIN AND SONS.



## INTRODUCTION.

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The Catalogues which follow occupied the late Mr. Blyth during the last three years of his life. Sir A. Phayre, K.C.S.I., now Governor of Mauritius, had requested him to undertake a sketch of the Natural History of Burma, which should form a chapter in a work on that country then under preparation. The MS. when obtained from Miss Blyth, after her brother's death, proved to constitute a more elaborate paper than Sir Arthur's purpose required. Blyth, as was his wont, had gone into the subject *con amore*, and had poured out all he knew of the Mammal and Avi-fauna of Burma. An Introductory Note, apparently not quite completed, accompanied the Catalogues, and reserving this as sufficient probably for his object, Sir Arthur handed over the rest of the MS. to me, suggesting that the pages of this Journal would be the most appropriate place for such a paper.

This suggestion was one in which I cordially concurred; but the late Dr. Stoliczka, the able editor of Part II. of the Journal, was far away in Kashgar, and Dr. Anderson, of the Indian Museum, was in England. There might be a difficulty, in their absence, in passing this roughly written MS. through the press in Calcutta. Here, on the contrary, the most competent editorial aid offered; and having received the kindest assurances from Lord Walden, Dr. Anderson, and Dr. Dobson, I addressed the President of the Society, and proposed that the Catalogues should be published in London. This proposal was at once assented to, with a due expression of thanks on the part of the Council of the Society, both to Sir A. Phayre and to the gentlemen just named, whose respective shares in this publication will be explained in the sequel.

More than one obituary notice of Blyth and his scientific labours, by competent and kindly pens, has already appeared in the columns of those Journals to which he had been in the habit of contributing. This seems



a fitting place for collecting in a brief memoir such particulars as are obtainable of his early life, and such as I can myself supply of his long career in our Society's service. My personal acquaintance with him commenced on my return to India from furlough in 1848. He had then been Curator of our Museum for seven years, and my official connexion with the Society, combined with a taste for his pursuits, brought me into frequent and close relations with him. Of the incidents of his pre-Indian life some knowledge has been obtained from his sister, who has kindly given me access to such of his letters as are in her possession.

The carbon print which accompanies this memoir has been prepared by the Autotype Company from a photograph taken of Blyth when he visited Dublin some ten years ago. It has been kindly contributed to me by Miss Blyth and her relative Mr. R. Loder, of High Beeches, Crawley, Sussex.

Edward Blyth was born in London on the 23rd December, 1810. His father was of a Norfolk family, and from him the son appears to have inherited both his taste for nature and the retentive memory for which he was so remarkable. Blyth's father died in 1820, leaving four children, whose care and education now devolved on the widow, a Hampshire lady, who at once sent Edward, the eldest boy, to Dr. Fennell's school at Wimbledon. Here the boy seems to have made unusual progress in his books, but the school reports describe him as of truant habits, and as being frequently found in the woods. He left school in 1825, and his mother seems at first to have intended him for an University career, and ultimately for the Church, but at Dr. Fennell's suggestion she sent her son to London to study chemistry under Mr. Keating, of St. Paul's Churchyard. He did not, however, long persevere in this study, being dissatisfied with his instructor's mode of teaching. His enthusiasm for Natural History pursuits disinclined him for any ordinary employment, and on coming of age he embarked the little means he had in a druggist's business at Tooting. To this he seems to have given little personal attention. The management of the business was left to another, while Blyth devoted all his time to the study which engrossed his thoughts. "Never," says his sister, "was any youth more industrious; up at three or four in the morning, reading, making notes, sketching bones, colouring maps, stuffing birds by the hundred, collecting butterflies, and beetles—teaching himself German sufficiently to translate it readily, singing always merrily at intervals." He took a room in Pall Mall, to have readier access to books, and passed much of his time in the British Museum, in which, or in some kindred institution, he tried hard to find employment.

Naturally the Tooting business did not thrive under such fitful manage-



ment. Blyth soon found himself in serious difficulties; such literary work as offered itself in his own special line of study supplied him with but precarious means. In the Introduction to his edition of White's 'Selborne,' which bears date from Lower Tooting, 1836, he alludes to the anxieties which then surrounded him, though "his mind," he adds, "cleaves to its favourite pursuit in defiance of many obstacles and interruptions, and eagerly avails itself of every occasion to contribute a mite to the stock of general information." Young as he was, Blyth had at this time earned for himself a reputation as a diligent and accurate field observer, and he corresponded with many of the leading naturalists of the day. He seems to have been a contributor to both Loudon and Charlesworth's series of the Magazine of Natural History from 1833 till his departure for India, and in one of his papers of the volume for 1838 he proposed a new arrangement of Insessorial birds. Rennie enlisted him as a writer in the "Field Naturalist," and he was associated with Mudie, Johnston, and Westwood, in an illustrated translation of Cuvier, which was published by Orr and Co. in 1840. Blyth undertook the Mammals, Birds, and Reptiles in this work, adding much original matter of his own, which is inclosed within brackets. A new and enlarged edition of the work appeared in 1854, with important additions to the Molluscs and Fishes by Dr. Carpenter.

The Proceedings of the Zoological Society from 1837 to 1840 contain a few papers read by Blyth at their meetings. One of these, on the Osteology of the Great Auk, observes on the distinctive characters of Auks and Penguins. In another he draws attention to peculiarities in the structure of the feet of the Trogons. But the most important of these contributions was his Monograph of the genus "Ovis," read in 1840.\* He here describes fifteen species of Sheep, including the then newly discovered *O. poli*, from Pamir. At the same meeting he exhibited drawings and specimens of the Yak, Kashmir Stag, Markhur, Himalayan Ibex, and other Indian ruminants, his remarks on which show the attention which he had already begun to give to the Zoology of India.

Just at this time our Society had obtained from the Court of Directors a grant for a paid Curator of its Museum, which had grown into a collection beyond what was manageable by the honorary office-bearers who had

\* Proc. Zool. Soc., July 28. This was an "Amended List" of species, of which he had enumerated nine in a summary Monograph in the previous February. This paper was reprinted in Taylor's Mag. of Nat. Hist. in 1841, and again with additional matter in J.B.A.S. vol. x. pt. 2, p. 858.



hitherto looked after it. The labours of Hodgson, Cantor, M'Clelland, and others, had filled it with valuable Zoological specimens, which with important fossil and other contributions were falling into great disorder. Prof. H. H. Wilson, then our honorary agent in London, was asked to select a competent man to undertake the general charge of the Museum, and the appointment was offered to and accepted by Blyth, then in weak health, and professionally advised to seek a warmer climate. Provided with passage and outfit by the Court of Directors, the latter arrived in Calcutta in September, 1841. His letter to Mr. H. Torrens, published in our Society's Proceedings for that month (vide Journ. Vol. X. Pt. 2, p. 756), expresses the diffidence with which he entered on the charge of the Mineral Department of the Museum; but of this duty he was largely relieved in the following year on the appointment of Mr. Piddington to all the Departments of Economic Geology. He still retained the custody of the Palæontological specimens.

One of the duties impressed on him by our then President, Sir E. Ryan, was that of furnishing monthly reports at the Society's meetings; and in October, 1841, he accordingly submitted the first of that long series of useful reports which appear in our Proceedings with scarcely any intermission for the next twenty years. Each of the monthly issues of this Journal for the remainder of 1841 contains a paper by Blyth. In the first of these, 'A general review of the species of True Stag,' etc., he committed himself to an opinion, shared with him by Ogilby, regarding Hodgson's *Cervus affinis*, which, as Jerdon has pointed out (Mamm. p. 252), he did not recant till 1861.

Many of Blyth's reports fill from fifteen to twenty pages, and his remarks on the various contributions which reached him were just what were wanted by the field observers who supplied them. The active correspondence which he set on foot with these and with sportsmen, all more or less naturalists, throughout India, encouraged their useful pursuits, and brought him a large accession of specimens. He received in July, 1846, the thanks of the monthly meeting of our Society for his exertions "in opening out new channels of scientific intercourse." \* He had already found it necessary to apply for assistance in his Museum duties, but the Society had not the means of supplementing the Government grant beyond the small allowance which they gave him for house rent. Had Blyth been less devoted to the special service in which he had engaged, there were not wanting to him opportunities of finding far more remunerative employment in other

\* J.B.A.S. xv. p. 51.





quarters. The Dutch authorities in Java seem to have about this time made him a very tempting offer.

The Proceedings of the Zoological Society for 1841 and 1842 contain two letters from Blyth, of which one was written on the voyage out to India,\* and the other shortly after his arrival.† The latter contained remarks on various species of birds found in India and Europe. Nothing from his pen appears in the Calcutta Journal of Natural History, of which the publication had just commenced when he reached India, and which was brought to a close in 1847. He found time, however, to send home several papers for the Annals of Natural History in 1844-48, as will be seen in the List appended to this Memoir, in which I have endeavoured to collect the titles of all his published writings.

The unpleasant episode in regard to the publication of the Burnes Zoological drawings with Dr. Lord's notes had occurred before I joined the Society. The materials, which consisted of certain wretched figures by a native artist, and some descriptions of already well-known species, the Afghanistan localities of which were alone new, had been made over to us by the Government before Blyth became our Curator. The lithographer's death had brought the work to a stand, and when inquiry was made in 1844, the notes which were to furnish the letterpress were not forthcoming. Blyth's explanation of his share in their disappearance will be found in our Proceedings of October, 1844.‡ This was followed by a controversy with Mr. Torrens,§ then our Secretary; and the financial embarrassments of the Society soon afterwards necessitated the abandonment of the publication. Of the fourteen coloured copies of the completed plates, I possess one, and I quite agree with Blyth that their issue would have brought ridicule on the Society.

The heavy outlay incurred on this undertaking, and on the publication of Cantor's Chusan drawings, was unfortunately the cause, not only of the embarrassments just noticed, but of a temporary estrangement between the Philological and Physical classes of our members. Funds which had been assigned by the Government for furthering Oriental literature had no doubt been appropriated to other objects. Blyth came in for a share of this discontent on the part of the Orientalists, and some Naturalists also complained that he was enriching the Mammal and Bird departments of the Museum at the expense of those of the shells, fossils, and insects. The want, too, of a Catalogue of the collections had been long felt, and the

\* P.Z.S. 1841, p. 63.

† J.B.A.S. xiii. pt. 2, p. 51.

‡ *idem.* 1842, p. 93.

§ *idem.* xiv. pt. 2, p. cvi.



Curator had been repeatedly urged to supply it. The Council refers to his delay in performing this duty in their Report\* of 1848, while commending "his regularity of attendance and remarkable industry." His application for increased pay and a retiring pension was referred to the Society at large with the following guarded remarks:—"It must be admitted that for any scientific man capable of discharging the duties on which Mr. Blyth is employed, and of performing them with activity and zeal, for the advancement of science, etc., the [monthly] salary of 250 rupees is a very inadequate compensation. But the Council cannot but regard the present as an inauspicious period to address the Honourable Court in furtherance of any pecuniary claim. The diversion of the Oriental grant to so large an amount as has but lately been brought to notice, cannot be regarded with indifference by them, nor can it have disposed them to entertain with much favour any fresh demand on their munificence preferred by the Society." The application was then referred for report to the Natural History Section, and notwithstanding the stout struggle made on his behalf in the Section, their report was unfavourable to Blyth's claims, which were finally negatived at the July† meeting in 1848.

In the following year Blyth published his Catalogue of Birds, which had in fact long been ready for issue in a form which would have satisfied the Council. It had been constantly kept back for the Appendices, Addenda, and "Further Addenda," which disfigure the volume, and seriously detract from its value as a work of reference. This habitual reluctance of his to part with his compositions till he had embodied in them his latest gained information is conspicuous throughout his contributions, and it is in fact partly due to this habit that these Burman Catalogues form a posthumous publication.

Blyth availed himself of every opportunity which offered of escape from his closet studies to resume his early habits of field observation. Frequent mention will be found in his reports of the little excursions into the country which he thus made, and of the practical results obtained from them. The geniality of his disposition and the large store of general information at his command insured him a warm welcome in all quarters. One of his favourite resorts was Khulna, on the edge of the Jessore Sunderbuns, where the indigo factory of an intelligent and untiring observer† offered him a favourable station for field pursuits.

\* J.B.A.S. xvii. pt. 1, p. 10.

† J.B.A.S. xvii. pt. 2, p. 122.

‡ Our common friend Robert Frith, whose name is of frequent occurrence in the Curator's reports.





Several contributions from Blyth on his special subject will be found in the pages of the different sporting Journals which have appeared in Calcutta. He was on the regular staff of the 'Indian Field.' In the 'India Sporting Review' he published a sketch of 'The Osteology of the Elephant,' and a series of papers on 'The Feline Animals of India.' For the 'Calcutta Review' he wrote an article on the 'Birds of India.' It gives the results of his latest experience on the subject of the communication made in 1842 to the Zoological Society, which has been noticed above, and shows that of 353 species of birds admitted by Yarrell into the English avifauna, no less than 140 are found in India.

In 1854 Blyth was married to Mrs. Hodges, a young widow whom he had known as Miss Sutton, and who had lately come out to join some relatives in India. This step on his part necessarily aggravated the embarrassments entailed on him by his inadequate income, and on completing his fourteenth year of service in 1855, he memorialized the Court of Directors for an increased salary and for a pension "after a certain number of years' service." In the second paragraph of his memorial he observes, "that however desirous the Asiatic Society might be of augmenting your memorialist's personal allowances, the ever-increasing demands on its income, consequent on the extension of its collections among other causes, altogether disables it from so doing." On this memorial being submitted to the meeting\* of May, 1856, it was agreed to forward the document to Government, "with the expression of the high sense entertained by the Society of the value of Mr. Blyth's labours in the Department of Natural History, and of its hope that the memorial may be favourably considered by the Honourable Court."

The extract just given will show, in Blyth's own words, that he had no complaints to make of our Society's treatment of him. Mr. A. Hume, who seems to have first joined our Society in 1870, has gone somewhat out of his way in his 'Rough Notes'† to do justice to Blyth's merits as Curator, at the expense of older members. The language used is in Mr. Hume's characteristic style, and is as offensive as the charge brought against the Society is unjust. The same charge is implied in the use of the words "neglect and harshness" in the "In Memoriam" with which vol. ii. of 'Stray Feathers' opens, and which, with this exception, describes with much truth and feeling the life-long struggle in India, as at home, which Blyth's

\* J. B. A. S. xxv. 237.

† See note to 'My Scrap Book or Rough Notes on Indian Oology and Ornithology,' No. 1, p. 181.



scientific ardour supported him in maintaining against the most depressing obstacles.

That nothing came of this memorial is due probably in some measure to the movement which commenced in 1857 for transferring our collections to an Imperial Museum, but mainly to the great convulsion which shook our empire in that year. I find no record in our Proceedings of any reply having been made to our recommendation, and the negotiations for the foundation of the new museum were not resumed for some three years.

Blyth made a short tour in the N.W. Provinces in July, 1856. He spent some six weeks in Lucknow, Cawnpore, Allahabad, and Benares. Oude had just been annexed, and the sale of the Royal Menagerie at Lucknow had been determined on. The tigers were the finest caged specimens in the world, and to one who understood their value in the European market, the inducement to buy and ship the animals was irresistible. A German friend joined in the speculation, and found the necessary funds. Blyth was to do the rest, and as no competitors offered, he bought the bulk of the collection for a trifle. Eighteen magnificent tigers were sold at 20 rupees (£2) a head! Some casualties occurred on the passage down the river; but his collection, when exhibited in Calcutta, contained sixteen tigers, one leopard, one bear, two cheetas, three caracals, two rhinoceroses, and a giraffe, which carried a saddle and was daily ridden. Difficulties unfortunately occurred in finding ships for the transport of the animals, and their detention in Calcutta caused further casualties and heavy charges, which his partner would not face. The speculation collapsed, but one of the tigers which reached England realized £140.

In December, 1857, Blyth had the misfortune to lose his wife. His short married life had been of the happiest, and the blow fell heavily on him. His letters to his sister for the early months of 1858 are painful to read. The shock proved too much for him, and brought on a serious attack of illness; it threatened paralysis of the heart, and he seems to have been subject to partial returns of similar attacks for the rest of his life. His health too suffered much from the isolation imposed on him by his straitened means, and from want of proper exercise. Some distraction for his thoughts was luckily afforded at this time by the opening up of a new fauna in the Andaman Islands, which Dr. Mouatt had been sent to report on before their occupation as a penal settlement. To this Report Blyth contributed an interesting chapter on the Zoology of the Islands, so far as it was then known.

The China expedition of 1860 was considered both at home and in India a good opportunity for obtaining information regarding the natural history of





North China. Blyth's name was put forward as that of a naturalist readily available and eminently qualified for the post of naturalist to the expedition. Replying to Lord Canning's objections that scientific observations in a hostile country would have to be carried on at much personal risk, our Council,\* while urging the importance of the mission in a scientific point of view, stated on Blyth's behalf that "he was quite willing to encounter the danger, whatever it might be." The application, however, failed: no naturalist was appointed. This result was to be regretted, as it affected Blyth personally, for his health was failing, and the sea-voyage, with the stimulus afforded by so interesting a mission, would have been most beneficial to him, and would probably have averted the utter breakdown which was now at hand. It is doubtful whether he was equal to the more laborious task which he offered to undertake in the following year, when the scientific expedition into Chinese Tartary was projected by the Government.

Blyth was a staunch adherent of Darwin's views, and an opportunity of thus declaring himself offered at our November meeting in 1860, when Mr. H. Blanford read his paper on the well-known work of Dr. Broun on the laws of development of organized beings. The value attached by Darwin to Blyth's observations is shown by the frequent reference made to them, more especially in his 'Animals and Plants under Domestication.' His first citation of Blyth in the latter work describes him as an "excellent authority," and the many quotations that follow in these interesting volumes show how carefully he read and noted all that fell from Blyth, even in his contributions to sporting journals.

In 1861 Blyth's health fairly gave way, and in July of that year a second memorial was submitted to Government† with a view to obtaining a reconsideration by the Secretary of State for India of his claims to a pension. Lord Elgin, the new Viceroy, took up the subject warmly, and pressed it on the attention of the Home authorities as a special case:‡ "the case," as he observed, "of a man of science who had devoted himself for a very small salary to duties in connexion with the Asiatic Society, a body aided by and closely identified with the Government of India, from which the public have derived great advantage." After describing Blyth as "the creator of the Natural History Museum, which has hitherto supplied the place of a public museum in the Metropolis of India, and which will probably soon be made over to Government as part of a national museum," and referring to the

\* J. B. A. S. xxix. p. 82.

† J. B. A. S. xxxi. 60.

‡ *Idem.* xxxi. 430.



importance of Blyth's labours in zoology in maintaining and extending the character and standing of our Society, this dispatch concludes thus: "His Excellency in Council considers, therefore, that if under such circumstances Mr. Blyth should, after twenty years' service, be compelled to retire from ill health, brought on very much by his exertions in pursuit of science, it would not be creditable to the Government that he should be allowed to leave without any retiring pension."

Meanwhile, Blyth was only enabled to remain at his post by the facilities which the Council afforded him of making short successive visits to Burma. He was for some five months in that province, from which, and more especially from the Yonzalin River, he communicated several interesting letters. His camp life there agreed with him, and he had kind friends like Phayre, Fytche, and Tickell to associate with and take care of him. His return to Calcutta was always attended by a relapse, and the hot season of 1862 brought him to a state for which there was no alternative but instant departure for Europe. As yet, however, no orders had been received from home in regard to the pension. It was clear that for these it would not do to wait, and the Council\* under the emergency gave Blyth a year's leave on full pay. He had hardly gone when the expected reply was received, and this, notwithstanding the Viceroy's strongly expressed opinion, proved† an unfavourable one. Eventually‡ a pension of £150 a year was conceded, owing, I believe, mainly to the untiring efforts made in London on Blyth's behalf by the late Sir P. Cautley and Dr. Falconer.

By the end of 1864 our Society's negotiations with the Government for the transfer of its collections to the Indian Museum had been brought to a successful close, and at the November meeting the following just tribute was paid to our late Curator in the form of a resolution, which, on the Council's proposition, was carried unanimously:—

"On the eve of transferring the zoological collections of the Society to Government, to form the nucleus of an Imperial Museum of Natural History, the Society wishes to record its sense of the important services rendered by its late Curator, Mr. Blyth, in the formation of those collections. In the period of twenty-two years during which Mr. Blyth was Curator of the Society's Museum, he has formed a large and valuable series of specimens richly illustrative of the ornithology of India and the Burmese Peninsula, and has added largely to the Mammalian and other vertebrate collections of

\* The Council's action in anticipation of the vote of a meeting was cordially approved at our annual meeting of 1863, but was protested against as illegal by Mr. Oldham.

† J. B. A. S. xxxii. 32.

‡ J. B. A. S. xxxiii. 73.



the Museum; while, by his numerous descriptive papers and catalogues\* of the Museum specimens, he has made the materials thus amassed by him subservient to zoological science at large, and especially valuable to those engaged in the study of the vertebrate fauna of India and its adjoining countries."†

Blyth was elected an Honorary Member of the Society in the following year. The Museum was now under a Board of Trustees, and a new Curator, better paid, and with all the prospective advantages of a Government official, had taken charge of it. Writing to me from Malvern, in June, 1865, Blyth says: "I had always a presentiment that my successor in the Museum would be more adequately remunerated, beginning with just double what I had after more than twenty years' work, with an additional £50 yearly, and house accommodation! How very much more could I have accomplished with such an income!" With this mild explosion he brushed off discontent, and strove to make the most of his small means. His letters to me, and these were frequent up to the time of my leaving India in 1868, were full of his own special subject; some of them are published in our Society's Proceedings.

In January, 1864, Blyth visited Dublin, where he read two papers before the Royal Irish Academy. The first of these was 'On the True Stags or Elaphine division of the genus *Cervus*,' and does not appear to have been printed *in extenso* in the Academy's Proceedings.‡ His other paper, 'On the Animal Inhabitants of Ancient Ireland,' was published at length in the Academy's Proceedings § of January 25th. What the extraordinary bones were which he exhibited at the meeting, and which he referred to as "probably Tibetan," was not explained in any of his letters.

At a meeting of the Geological|| Society of Dublin, he made some remarks on a paper of Professor Haughton's 'On Geological Epochs,' and expressed his concurrence in Dr. Carte's identification of the bones of the Polar Bear discovered in Lough Gur, in County Limerick. On further examination, however, these bones have been pronounced by Mr. Busk to be indistinguishable from those of *Ursus ferox*.

The question of zoological distribution will be found to have been treated by Blyth, in a paper which he contributed to 'Nature' in 1871

\* Blyth's Catalogue of Mammalia was published in 1863, its last sheets being carried through the press by his friend Jerdon.

† J. B. A. S. xxxiii. 582.

‡ Vol. viii. Jan. 11, 1864, p. 458.

§ *Id. qu. sup.* p. 472.

|| Proceedings G. S. D. for January 13, 1864, Journ. p. 173.



(March 30). He had been led to consider it while drawing up the introductory chapter which was to preface these catalogues, for in a letter to me dated 15th July of that year he refers to this MS. as follows:—

“I suppose that Phayre showed you my sketch of what I conceive to be the true regions and sub-regions of S. E. Asia, and I expected that he would have modified somewhat my notions with regard to the provinces into which I venture to divide the *Indo-Chinese sub-region*, but he seems to have assented to them altogether. Only yesterday I received the ‘Proceedings of the Asiatic Society’ for April and May last, and the ‘Journal of the Asiatic Society of Bengal,’ Part II., No. 1, 1871, and in p. 84 of the ‘Proceedings’ I find some remarks by Stoliczka which quite confirm my views, only that I think that, with regard to the extension of the Malayan fauna into India, he should rather have said *Southern India*, because the African affinities of Central and Northern India, inclusive of the Siwâlik Deposits, are of ancient date, as shown by the occurrence of *Bos namadicus* in Central India, which is barely separable from the European *B. primigenius* (a type of *Bos* which is elsewhere only known from Europe), and by the presence of giraffes and of antelopes of African type in the Siwâlik Deposits. I have such an enormous mass of valuable facts to deal with, that I gave over making them public in dribblets at the meetings of the Zoological Society; and I have now time and undisturbed leisure to treat of them in a work which I am preparing on ‘The Origination of Species,’ a subject upon which I think I can throw some light.”\*

As pointed out in a note, Blyth’s ‘Austral-Asian region’ is generally the same with Dr. Sclater’s ‘Indian region,’ *minus* Hindustan proper, or the plains of Upper India east and south of the north-west desert—the Dukhun or table-land of the Peninsula with the intervening territory, inclusive of the Vindhyan Ghats—the Coromandel Coast and the low northern half of Ceylon—all of which Blyth places in his Ethiopian region. What remains of India after this large deduction Blyth distributes through three sub-regions, viz. the Himalayan, Indo-Chinese, and Cinghalese. India cannot, he argues, be treated as a natural zoological province: it is a border-land in which different zoological regions meet, and one, therefore, “of extraordinarily complex zoological affinities.” Burma of course falls within his Indo-Chinese sub-

\* Among the papers left by Blyth is one headed ‘Origination of the Various Races of Man,’ which he may have intended to form part of the book here referred to. It contains nothing original, but brings together numerous points of resemblance and contrast observable in the several groups of the order Primates.





region, which extends southward as far as Penang and Province Wellesley, where his Malayan sub-region commences.

The interest which Blyth had always taken in the Rhinoceros group was revived by the safe arrival at the Zoological Gardens of the Chittagong individual, the *Ceratorhinus crossi* of the present Catalogue. In his paper contributed to the 'Annals' in 1872, he argues against Gray's assignment of this species to *Rhinoceros sumatrensis*, and in favour of its identity with the fine Tavoy specimen shot by Col. Fytche, and figured in this Journal, vol. xxxi. p. 156. Blyth's conjecture that the Arakan Hills is one of the habitats of this species is borne out by the letter in which Capt. Lewin, the superintendent of the Hill Tracts of Chittagong, first reported to me in 1867 the capture of the animal.\* After giving her measurements, which were then 6 feet from crown of head to root of tail, and 4 feet 2 inches in height, and otherwise minutely describing her horns, Capt. Lewin adds: "You are mistaken I think in supposing that she has come from the Tenasserim Provinces—the two-horned species is found in my hills. I have seen one alive, and several of my men have seen a dead one."

In the Journal of Travel and Natural History, No. 2,† of 1868, will be found a letter from Blyth in explanation of some remarks which he had made at the Zoological Society on the occasional shedding or loss by violence of rhinoceros' horns, followed by their renewal. In this he takes the opportunity of pointing out the tendency which some species have to develop a rudimentary horn on the forehead, and argues for the possible explanation in this manner of cases of three-horned rhinoceroses being reported by travellers.

The connexion which Blyth established, first with 'Land and Water,' and later with the 'Field,' gave him interesting literary occupation; and the 'Naturalist' columns of both these journals abound in scraps by 'Zoophilus,' which did real service to the advancement of scientific truth. No pen so ready as his to expose current fallacies or sensational announcements in works of travel of the results of loose and careless observations. Very many of his 'scraps' are worthy of being collected and preserved, for such use as we see they have been turned to by Mr. Darwin. These columns occasionally contained more elaborate papers, such as the series in the 'Field' for 1873, on 'Wild Animals dispersed by human agency,' and 'On the Gruidæ or Crane family.' This monograph, for such it amounts to, was

\* The date of capture is erroneously given, both by Mr. Blyth and by Dr. Anderson in his cited communication to the Zoological Society.

† Page 130.



its writer's last utterance. He had long been ailing, and in the autumn of this year he became very ill, and went to Antwerp for a change. On his return he called on me, feeling, as he said, better, though complaining of great prostration. He seemed full of what he had seen in the Antwerp Zoological Garden, where he thought he had found another new species of Rhinoceros. This was our last interview. Though nursed by a tenderly-attached sister, his weakness increased, and he died of heart disease on the 27th of December, within a day or two of his 63rd birthday.

More competent authorities than I can pretend to be have done justice to the high intellectual powers which Blyth displayed from the outset of his career as a naturalist; to the wonderful capacity and accuracy of his memory, which, unassisted by any systematic notes, assimilated the facts once stored in it, and enabled him readily to refer to his authority for them; to his great power of generalization, and to the conscientious use which he made of it. Abundant proof of the high respect with which his opinions were always listened to, and of the careful consideration given to them even where they were not accepted, is to be found in the published works of his brother naturalists. No higher testimony to his habitual scientific caution need be adduced than that of Mr. Darwin, but it is equally borne by Jerdon throughout his published writings. Gould\* refers to him as "one of the first zoologists of his time, and the founder of the study of that science in India." I confine myself here to putting on record the tribute of an old and intimate friend, to the excellent qualities of heart possessed by Blyth. The warmth and freshness of his feelings which first inspired him with the love of Nature clung to him through his chequered life, and kept him on good terms with the world, which punished him, as it is wont to do, for not learning more of its wisdom. Had he been a less imaginative and a more practical man, he must have been a prosperous one. Few men who have written so much have left in their writings so little that is bitter. No man that I have ever known was so free as he was from the spirit of intolerance; and the absence of this is a marked feature in all his controversial papers. All too that he knew was at the service of everybody. No one asking him for information asked in vain. Among the many pleasurable reminiscences of my own long residence in India, few are more agreeable than those which recall his frequent Sunday visits to me.

The Society are largely indebted to the three able Naturalists who have lent their aid to the publication of these Catalogues. That of the Mammalia, with the exception of the Bats, was revised by Dr. Anderson last

\* 'Birds of Asia,' Pt. XXVI. *Trochaloxyeron blythii*.





year, before he was summoned to India to join the second expedition to Yunnan. Dr. Dobson, of the Royal Victoria Hospital of Netley, has edited the Catalogue of the order *Chiroptera*, the study of which he has long specially cultivated. In both cases the notes and additions of the editors are inclosed within brackets, and bear their respective initials. One or two notes added by myself are signed 'Editor.' All unsigned notes and citations of references are those of the author of the Catalogues.

The Catalogue of Birds will be found, under Lord Walden's able and conscientious treatment, to be a complete list of the Burmese species, 660 in number, as ascertained to date. His editorial notes and additions, which embrace the latest information afforded by his fine collection, are inclosed in brackets, and largely enhance the value of the Catalogue. Blyth's MS., for the species enumerated in it, has been scrupulously adhered to, obvious errors of orthography having alone been corrected, and localities being added where the habitats were doubtful when he wrote. On this last point I quote Lord Walden's own words:

"The names of the localities added are given on the authority of Mr. Davison, Mr. Oates, Major Lloyd, Captain Feilden, and Lieutenant Wardlaw Ramsay, whose initials will be found attached. My endeavour has been to include those localities which, while within the range, are not specified by Mr. Blyth. All Major Lloyd's and Lieutenant W. Ramsay's specimens and some of Captain Feilden's have been identified by me. Mr. Hume is responsible for the accurate identification of those obtained by Mr. Davison and Mr. Oates, and although that gentleman, in most cases, adopts the faulty nomenclature of Mr. G. R. Gray's Hand List, I believe I have succeeded in correctly interpreting his meaning."

A. GROTE.

LONDON, August 27, 1875.

*List of Mr. Blyth's published papers in the Journal of the Asiatic Society of Bengal and other Journals, with the necessary references.*

Curator's Reports, read at the Society's Monthly Meetings.

Report for September, 1841, read by his predecessor, Mr. Piddington, on the occasion of Mr. Blyth's first introduction to the meeting of the 6th October, X. 836.

Report for October, 1841, X. Pt. 2, 917.

„ November, 1841, X. Pt. 2, 936.





- Report for January, 1842, XI. Pt. 1, 95.
- „ February, 1842, XI. Pt. 1, 129.
- „ April, 1842, XI. Pt. 1, 444.
- „ June, 1842, XI. Pt. 1, 585.
- „ July, 1842, XI. Pt. 2, 788. The two Appendices to this Report monograph the Asiatic Drongos and Quails.
- „ August, 1842, XI. Pt. 2, 865. Treating mainly of Reptilia.
- „ September, 1842, XI. Pt. 2, 880.
- „ October, 1842, XI. Pt. 2, 969.
- „ November, 1842, XI. Pt. 2, 1202.
- „ February, 1843, XII. Pt. 1, 166. To which is appended a revision of all previous reports, beginning with some interesting observations on Asiatic Simiadæ.
- „ November, 1843, XII. Pt. 2, 925. This is entitled the "Monthly Report for December, 1842," but it contains Addenda, which cover the whole intervening period. It is very full and interesting, especially in its comments on collections from Darjeeling.
- „ May, 1844, XIII. Pt. 1, 361. Further appendix to the above report for December, 1842. It describes the Mynahs and Babblers.
- „ November, 1846, XV. p. xcix.
- „ February, 1847, XVI. Pt. 1, 209.
- „ March, 1847, XVI. Pt. 1, 385.
- „ April, 1847, XVI. Pt. 1, 502.
- „ May, 1847, XVI. Pt. 1, 603.
- „ June, 1847, XVI. Pt. 2, 725. Describing the Quadrumana in the Society's Collection.
- „ July, 1847, XVI. Pt. 2, 863. Describes the Sciuridæ in the Society's Collection, and gives Addenda to previous Reports.
- „ August, 1847, XVI. Pt. 2, 992. With Supplement. Describes the Hornbill group.
- „ December, 1847, XVI. Pt. 2, 1271. Remarks on the different species of Pangolins.
- „ January, 1848, XVII. Pt. 1, 82.
- „ March, 1848, XVII. Pt. 1, 247.
- „ April, May, and June, 1848, XVII. Pt. 1, 559.
- „ January, 1849, XVIII. Pt. 1, 80.
- „ June, 1850, XIX. 426.
- „ July, 1850, XIX. 490.
- „ September, 1850, XIX. 497.





Report for October, 1850, XIX. 561.

„ January, 1851, XX. 108. (Arrear Reports of 1849.)

„ February, 1851, XX. 213.

„ August, 1851, XX. 443.

„ April, 1852, XXI. 341-358.

„ May, 1852, XXI. 433.

„ May, 1853, XXII. 408.

„ September, 1853, XXII. 580.

„ October, 1853, XXII. 589.

„ February, 1854, XXIII. 210. Appends a short note to his paper on Orangutans in Vol. XXII.

„ October, 1854, XXIII. 729. Describes in a note the series of Indian and Tibetan Foxes in the Society's Museum.

„ February, 1855, XXIV. 178.

„ March, 1855, XXIV. 187.

„ April, 1855, XXIV. 252. Reports on Rüppell's contributions from Abyssinia, and mentions Tickell's and Frith's discoveries of Adjutants' nests.

„ May, 1855, XXIV. 359.

„ July, 1855, XXIV. 469. Enumerates in a note the series of smaller Squirrels in the Society's Collection.

„ October, 1855, XXIV. 711. Is mainly given to notices of Theobald's contributions of Reptiles and other specimens from Tenasserim provinces.

„ August, 1856, XXV. 439. Remarks in a note on the two supposed wild types of the Domestic Cats of India.

„ May, 1857, XXVI. 238.

„ July, 1857, XXVI. 284.

„ October, 1857, XXVI. 314.

„ December, 1857, XXVII. 81. Subjoins in a note a synopsis of the species of *Palæornis* with their synonyms.

„ May, 1858, XXVII. 267. Describes Dr. Liebig's contributions from the Andaman Islands, and numerous Siluroid and other Fishes obtained in the neighbourhood of Calcutta.

„ February to May, 1859, XXVIII. 271. Further observations on Andaman collections. A note elucidates the series of Flying Squirrels.

„ September, 1859, XXVIII. 411. Reports on Tickell's contributions from Tenasserim.





Report for March, 1860, XXIX. 87. Reports on Swinhoe's contributions from Amoy and Formosa; on Cape specimens from Layard; and on further collections from the Andaman Islands.

„ April and May, 1860, XXIX. 447.

„ May and June, 1860, XXX. 90. Reports on collections from China, the Philippine Islands, and Cape of Good Hope.

„ July, 1861, XXX. 185. Comments on Stags and Stag horns. This report first announces his new conclusions in regard to *Cervus affinis*.

„ February, 1862, XXXI. 331. Reports on collections from British Burma, and enumerates in a note the ascertained species of Sciuridæ in that province.

„ February (continued), 1863, XXXII. 73, 451. Reports on collections from Burma and Port Blair. In a note are enumerated the Testudinata of the Burmese provinces so far as then ascertained.

Letter from Blyth, December 2, 1864, XXXIV. Pt. 2, 48. Comments on Milne-Edwards's Monograph of the Chevrotains.

„ No date. On *Inuus Assamensis* and Indian Rats and Mice, XXXIV. Pt. 2, 192.

„ September 17th, 1865, XXXIV. Pt. 2, 279. Refers to his forthcoming Comments in the Ibis on Jerdon's 'Birds of India.' Concludes with an enumeration of the species of *Arboricola*.

„ No date. XXXV. Pt. 2, 156.

Communications to the Journal of the Society. The papers marked with an asterisk were reprinted in the Annals of Natural History.

1841. General review of the species of true Stag, or Elaphoid form of *Cervus*, comprising those more immediately related to the Red Deer of Europe. X. Pt. 2, 736.

Monograph of the species of Wild Sheep. X. Pt. 2, 858.

Description of another new species of Pika (*Lagomys*) from the Himalaya. X. Pt. 2, 816.

Ditto of three Indian species of Bat, of the genus *Taphozous*. X. Pt. 2, 971.

1842. Notes on various Indian and Malayan Birds. XI. Pt. 1, 160.

Notice of the predatory and sanguivorous habits of the Bats of the genus *Megaderma*, with some remarks on the blood-sucking propensities of other *Vespertilionidæ*. XI. Pt. 1, 255.





1842. Monograph of the species of *Lynx*. XI. Pt. 2, 740.  
Descriptive notice of the Bat described as *Taphozous longimanus* by General Hardwicke. XI. Pt. 2, 784.  
Monograph of the Indian and Malayan species of *Cuculidæ*, or Birds of the Cuckoo family. XI. Pt. 2, 897 and 1095.
1844. Notes of various Mammalia, with descriptions of many new species—Pt. 1, Primates. XIII. Pt. 1, 463.\*  
Additions to and annotations on Hodgson's *Leiotrichine* Birds of the Sub-Himalaya, with a synopsis of the Indian *Pari* and Indian *Fringillidæ*. XIII. Pt. 2, 933.
1845. Notices and descriptions of various new or little-known species of Birds. XIV. Pt. 1, 173; XIV. Pt. 2, 546; XV. Pt. 1, 280; XVI. Pt. 1, 117–428.  
Description of *Caprolagus*, a new genus of Leporine mammalia. XIV. Pt. 1, 247.\*  
Drafts for a Fauna Indica—No. 1, *Columbidæ*. XIV. Pt. 2, 845.\*
1846. Notes on the Fauna of the Nicobar Islands. XV. 367.
1847. Some further notice of the species of Wild Sheep. XVI. Pt. 1, 350.
1849. Note on the *Sciuri* inhabiting Ceylon, and those of the Tenasserim provinces. XVIII. Pt. 1, 600.  
A supplemental note to the Catalogue of the Birds in the Asiatic Society's Museum. XVIII. Pt. 2, 800.
1850. Description of a new species of Mole (*Talpa leucura*, Blyth). XIX. 215.\*  
Remarks on the modes of variation of nearly affined species or races of Birds, chiefly inhabitants of India. XIX. 221.  
Conspectus of the Ornithology of India. XIX. 229—319, 501.
1851. Notice of a collection of Mammalia, Birds and Reptiles procured at or near the Plateau of Cherra Punji, in the Khasia hills north of Sylhet. XX. 517.  
Report on the Mammalia and more remarkable species of Birds inhabiting Ceylon. XX. 153.
1853. Remarks on the different species of Orangutan. XXII. 369.  
Notes and descriptions of various Reptiles new or little known. XXII. 639.
1854. Monograph of the Indian species of *Phylloscopus* and its immediate affines. XXIII. 479.\*
1855. Memoir on the Indian species of Shrews. XXIV. 24.\*  
Report on a Zoological Collection from the Somali country. XXIV. 291.





1855. Further remarks on the different species of Orangutan. XXIV. 518.
1857. Description of a new Indian Pigeon akin to the 'Stock Dove' of Europe, with notices of other *Columbinæ*. XXVI. 217.\*
1859. On the different animals known as Wild Asses. XXVIII. 229.\*  
On the Great Rorqual of the Indian Ocean, with notices of other Cetals, and of the *Syrenia* or Marine Pachyderms. XXVIII. 481.
1860. On the flat-horned Taurine Cattle of S.E. Asia, with a note on the races of Reindeer, and on Domestic Animals in general. XXIX. 282—376.  
Report on some Fishes, received chiefly from the Sitang river and its tributary streams, Tenasserim provinces. XXIX. 138.  
The Cartilaginous Fishes of Lower Bengal. XXIX. 35.
1862. Memoir on the living Asiatic species of *Rhinoceros*. XXXI. 151.  
Further note on Elephants and Rhinoceroses. XXXI. 196.  
Ditto on Wild Asses and alleged Wild Horses. XXXI. 363.
1863. Memoir on the Rats and Mice of India. XXXII. 327.

#### List of communications to the 'Ibis.'

- I. p. 464. 1859. Letter stating the occurrence of *Catarractes pomarinus* in Moulmein, with remarks on the Zoology of the Andamans.
- II. p. 323. 1860. Note on Edible Birds' Nests. His letter, from which extracts are also published, mentions his new Cassowary, *C. uno appendiculatus*.
- III. p. 268. 1861. Note on the Calcutta Adjutant, *Leptoptilus argala*.
- IV. 1862. Among his letters extracted from in this Vol., the last (p. 385), on Jerdon's new Birds from Upper Burma, is the most interesting.
- V. 1863. Catalogue of the Birds of India, with remarks on their Geographical Distribution. Part I. *Scansores* and *Raptores*.  
Note on the genus *Pyrrhula*.  
His letter extracted from at p. 117 of this Vol. announces Tytler's last Andaman discoveries, *Hamatornis Elgini*, etc.
- VI. 1864. His letter at p. 411 remarks on the distinct characters of the *Bucconidæ* and *Capitonidæ*, which he had pointed out so far back as 1838.
- NEW SERIES. I. 1865. A few identifications and rectifications of Synonymy.





- II. 1866. The Ornithology of India. A Commentary on Dr. Jerdon's 'Birds of India.'
- III. 1867. The same paper continued.  
The Ornithology of Ceylon. A supplement to Dr. Jerdon's 'Birds of India.'
- IV. 1868. Extracts from letters only.
- VI. 1870. Notes relating chiefly to the Birds of India; being Comments on the Collections of the Leyden Museum, which Blyth had visited in 1869.
- THIRD SERIES. II. 1872. Letter commenting on Hume's observations on *Haliæetus albicilla*, and on Khasia Birds in the India Museum.

Communications to 'Annals of Natural History.'

1843. FIRST SERIES. XII. pp. 90, 165, 229. List of Birds obtained in the vicinity of Calcutta, with remarks on their habits.
1844. XIII. p. 113. Further notice of the species of Birds occurring in the vicinity of Calcutta.
- XIII. p. 175. Description of some new species found in the neighbourhood of Calcutta.
- XIV. pp. 34-114. Further observations on the Ornithology of the neighbourhood of Calcutta, with notes by H. E. Strickland.
1847. XX. p. 382. Critical remarks on the republication by Mr. Strickland of Karl Sundevall's paper on the Birds of Calcutta.
- XX. p. 313. Critical remarks on J. E. Gray's Catalogue of Hodgson's Collections.
1848. SECOND SERIES. I. p. 454. Corrections of ditto.
1871. FOURTH SERIES. VIII. p. 204. On the supposititious *Bos (?) pegasus* of the late Col. C. Hamilton Smith.
1872. X. p. 399. On the species of Asiatic two-horned Rhinoceros.

I find on reference to the Index published in 1872 of the Proceedings of the Zoological Society, that besides exhibiting and remarking on Horns and other specimens at its meetings, Blyth contributed the following papers:—

1861. Notes on some Birds collected by Dr. Jerdon in Sikkim.  
Letter on *Rhinoceros crossii*, Gray.





1863. Synoptical List of the species of *Felis* inhabiting the Indian Region and the adjacent parts of Middle Asia.
1864. Notes on sundry Mammals (*Chevrotains*, Asiatic Civets, and the Unicorn Goat of Tibet).
1866. Ditto on African Buffalos.
1867. Remarks on an Indian Quail (*Rollulus superciliosus*).  
Notes on three Asiatic species of Deer, viz. *Rucervus duvaucelli*, *R. schomburgki*, and *Panolia eldi*.
1869. Notice of two overlooked species of Antelope (*Bosclaphus major* and *Strepsiceros imberbis*.  
On the Hybrid between the Chamois and the Domestic Goat.  
Contributed to Journal of Travel and Natural History.
1868. No. 4. Review of Layard's 'Birds of South Africa.'

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## ERRATA.

"No. 1. 1875," had been introduced into the upper corners of some of the earlier pages, which were printed off before the oversight was discovered.

p. 24. "Order Secundates" omitted in the heading over the words "Sub-order Carnivora."

p. 52, note. For "P.Z.S. 1873," read "1872."





CATALOGUE OF THE MAMMALS AND BIRDS OF BURMA.—By the late  
EDWARD BLYTH, C.M.Z.S.

Sub-kingdom VERTEBRATA.

Class MAMMALIA.

Order PRIMATES.

Sub-order CHEIROPODA.

Tribe CATARRHINI.

Fam. Hylobatidæ.

Gibbons, or Long-armed Apes.

\*1. HYLOBATES HOOLOCK.\*

*Simia hoolock*, Harlan; *H. scyrites* and *H. choromandus*, Ogilby. *Myouk Uluai-gyen*, Arakan; also *Too-poung*, of the Arakanese, Tickell.

The White-browed Gibbon inhabits the hill-forests from the basin of the Bráhmáputra to that of the Irawádi.

2. H. LAR.

*Homo lar*, L.; *Simia longimana*, Schreber; *S. albinana*, Vigors and Horsfield; *Pithecius variegatus*, Geoffroy (*nee* Kuhl); *H. entelloides*, Is. Geoffroy; *H. pileatus*, Gray.

The White-handed Gibbon bears the same native name as the preceding species, and inhabits the hill-forests of the Tenasserim provinces, Malayan peninsula, Siam, Cambodja, if not also Hainan, and probably the South of China.

According to Dr. Anderson, two species of Gibbon occur in the vicinity of Bhamo;† but I cannot help suspecting that mere differences of colour were so regarded, especially as one of them, mentioned as a light-coloured species, is indicated from native report only. Black examples of *H. hoolock* and *H. lar* have been figured from life by Dr. Sclater;‡ and

\* An asterisk prefixed denotes that the species was obtained by Sir A. P. Phayre.

† "Report of Expedition to Western Yunan viâ Bhamo," by J. Anderson, M.D., pp. 256, 271, 273.

‡ P. Z. S. 1870, p. 86, pl. v.



three differently coloured individuals, representing what I consider to be varieties of *H. lar* from Cambodja, by the name *H. pileatus*, have also been figured by Dr. Gray.\* The dubious *H. pileatus* is supposed by Mr. Swinhoe to be the particular kind of Gibbon which inhabits the Chinese island of Hainan, and he also reports the alleged existence of a black species of long-armed Ape in the country West of Canton.† The variations of colour of *H. hoolock* and *H. lar* I have elsewhere described;‡ and I have seen examples of *H. lar* from the Malayan peninsula corresponding to the figures assigned to the supposed *H. pileatus*.

Both the White-browed and the White-handed Gibbons vary exceedingly in shade of hue, from black to sullied white and pale fulvescent; the two sexes equally of *H. lar*, but the females only, so far as I have seen, of *H. hoolock*. The males of the latter would appear to be constantly black, the females rarely so, at least in Assam, though according to Colonel Tickell both sexes of it are always black in Arakan. A pale specimen from Sandoway has nevertheless been recorded.§ In the opinion of Col. Tickell the Gibbon of Arakan is different from that inhabiting the forests and hills of Káchár, Manipur, and Assam, "or, if the same," the latter "is so strongly modified as to be larger and stouter, with a totally different call, and subject to vary the same as *H. lar*, which *H. hoolock* in Arakan is not."|| I remember seeing a pair of tame Hoolocks, about full-grown, at Akyab, at a time when I had long been familiar with the animal, which is not rarely brought to Calcutta from the Gáro and other hill-ranges bordering upon the valley of the Bráhmáputra; and I failed to perceive the slightest difference in voice or any other particular.

Whatever the rest of the colouring may be, *H. hoolock* has constantly a broad white frontal band either continuous or divided in the middle; while *H. lar* has invariably white hands and feet, less brightly so, in some, and a white ring, encircling the visage, which is seldom incomplete. Some of both species are variegated or parti-coloured; and the pale examples of *H. lar* constitute the supposed *H. entelloides*.¶ Whether the two anywhere inhabit the same forests, and what the limits of the range of either of them may be, has yet to be ascertained, but the habits which Tickell and I have detailed may be considered to have generic application.\*\*

\* P. Z. S. 1861, p. 136, pl. xxi.

† *ibid.* 1870, pp. 224, 615.

‡ J. A. S. B. xvi. pp. 729, 730.

§ *ibid.* xiii. p. 464.

|| *ibid.* xxxiii. p. 196.

¶ Archives du Museum, tom. ii. p. 532, t. 1.

\*\* J. A. S. B. xiii. p. 464, and Tickell, *ibid.* vol. xxxiii. p. 196.





According to Dr. Theodore Cantor,\* the *H. variegatus*, Kuhl (*nec* Geoffroy, = *H. agilis*, Fr. Cuvier, = *H. rafflesii*, Geoffroy, = *H. leucogenys*, Ogilby), is also an inhabitant of the Malayan peninsula, though less numerous there than *H. lar*; *H. variegatus* occurring elsewhere for certain only in Sumatra, where it inhabits, together with *H. syndactylus* (*Simia syndactyla*, Raffles, *Siamanga syndactyla*, Gray), the Siamang or Pouched Gibbon. Helfer even states that the latter species has been found in the southern parts of the Tenasserim provinces, as high as the 15th deg. N. lat.† Cantor, however, does not include it in his "List of Mammalia inhabiting the Malayan Peninsula;" ‡ but Mr. Wallace asserts that it "is not uncommon in some parts" of that peninsula.§ This, it may be suspected, is a mistake, arising probably from the circumstance that—as Sir T. Stamford Raffles remarks—"Samang or Siamang is the name given to certain tribes of aboriginal inhabitants of the Malayan peninsula."|| The Siamang Ape, there is reason to believe, is quite peculiar to the island of Sumatra, where only Mr. Wallace actually observed it; and the fact that in other species of Gibbon the second and third digits of the foot are occasionally connected, may have deceived Helfer and others into the supposition that such animals represented the veritable *H. syndactylus*.

The Siamang is distinguished from all other Gibbons, not only by its much greater size, but by its possessing an inflatable laryngeal sac. Mr. Wallace remarks of it that "it moves much more slowly than the active *Hylobates*" (*H. agilis*, F. Cuvier), "keeping lower down on trees, and not indulging in such tremendous leaps; but it is still," he adds, "very active, and by means of its immense long arms, five feet across in an adult about three feet high, can swing itself along at a great rate." In all of the species of Gibbon the thumbs of both the hands and feet are separated from the other digits to the base of the metacarpal and metatarsal bones; a character which is distinctly represented in no published figure that I know of, nor am I aware that it occurs in any other quadrumana, with the exceptions of the allied lemurian genera *Indris* and *Propithecus*. It also is not generally understood that the long-armed Apes are true bipeds when on the ground, applying the sole flatly, with the pollux widely separated from the other digits; the hands are held up to be out of the way, rather than for balancing, and this even when ascending a flight of steps, as I have seen repeatedly, but they are ever ready to seize hold

\* J. A. S. B. xv. p. 173.

† *ibid.* vii. p. 358.‡ *Id.* p. 173.

§ "Travels in the Malay Archipelago," i. p. 134.

|| Tr. Lin. Soc., xiii. p. 242.



of any object by which the animal can assist itself along, even as a human being commonly grasps a banister when ascending a stair-case. Upon the forest trees, however, the Gibbons swing themselves about or forward by means of their upper limbs only, with extreme facility and grace, and at a marvellous rate of speed when duly exerting themselves, taking the most astounding hand-leaps in rapid and continuous succession when in full career. They are further remarkable for their exceedingly loud shouting cries, not unmusical in tone, which are often uttered in concert, and differ more or less in the different species.

Dr. Gray separates the Siamang from *Hylobates*, and expresses a suspicion that all the rest may prove to be local varieties of one species. I am familiar with four of them in the living state, and I consider these to be sufficiently well distinguished to rank as species. No one who knows the two could well confound a white-browed with a white-handed Gibbon, and their voices differ considerably. To the best of my recollection, that of *H. variegatus* also differs very appreciably from these; and the voice of *H. leuciscus*, which is peculiar to Java, I do not remember to have heard. Of the Bornean *H. concolor* (*Simia concolor*, Harlan, *H. harlani*, Lesson), I have only seen mounted skins, and it is most nearly akin to *H. variegatus*, if indeed separable from it; and *H. funereus*, Is. Geoff., is another alleged species inhabiting the "Solo" or Sulu Archipelago.\* Living specimens of both of the latter require to be compared with living specimens of *H. variegatus*.

#### Fam. Papionidæ.

Monkeys with simple stomach, and provided with cheek-pouches; inclusive of the African Baboons.

##### \*3. *INUUS LEONINUS*.

*Inuus leoninus*, Blyth, Catalogue of the Mammalia in the Museum of the Asiatic Society of Bengal, 1863, p. 7, No. 14; *Macacus nemestrinus*? var., J. A. S. B. vol. xiii. p. 473; *I. arctoides*? *ibid.* vol. xvi. p. 731; *M. andamanensis*, Bartlett, P. Z. S. 1869, p. 467 and fig.; 1870, pp. 220, 663, and pl. xxxv., p. 598. *Myouk-la-hoing*, Arakan; *Myouk-me*, Tenasserim, Mason.

The Long-haired Pig-tail Monkey was originally described from two skins without skull or other bones attached, which were transmitted to Calcutta from Arakan by the author of the present paper. One was that of a particularly fine male, with hair on the fore-quarters from four to five inches long, and the tail-tuft of a deep ferruginous colour,

\* Archives du Muséum, tom. v. p. 532, pl. xxvi.



which also tinged the fore-quarters. The other was that of a small young animal, rather pale in colour. It does not appear to be a common species, and chiefly inhabits the limestone mountains from the North of Arakan to an undetermined distance southward. In the Malayan peninsula, it is replaced by the nearly allied *I. nemestrinus*, the well-known Short-haired Pig-tail Monkey of the Malay countries, which is a likely species to inhabit also the southern Tenasserim provinces. Both of them are highly docile,\* and the manifold performances of "Jenny," the so-called Andaman Monkey, that lived for some time in the London Zoological Gardens, will be remembered by very many visitors. A fine male has since lived in the Regent's Park collection. In Sumatra the short-haired species is commonly trained to gather cocoa-nuts, as noticed by Raffles, and recently by an American traveller, Mr. A. S. Bickmore.†

The long-haired species distinctly tends to connect the Malayan Pig-tail Monkey with the series of Rhesus-monkeys; and one of these, *I. sancti-johannis*, Swinhoe, inhabiting the islets near Hongkōng, is described to be "like a Rhesus with a very short tail." Another Chinese species, *I. lasiotus*, Gray,‡ was described and figured as tail-less; but it is a common practice among Chinamen to deprive Monkeys of their tails, as was found on *post-mortem* examination to have been effected in the present instance, and the animal was otherwise like a Bengal Rhesus-monkey, only much larger. There is reason to believe that it inhabits the province of Tse-Chuen, whence probably it ranges southward into Hainan, in which island a Rhesus-like Monkey was obtained by Mr. Swinhoe, who regarded it as identical with the Bengal species. Another monkey of the same group inhabits Formosa, *I. cyclopis*, Swinhoe,§ small and dark in colour. Then, besides *I. erythræus*, (*Simia erythræa*, Schreber, *S. rhesus*, Audebert), of Bengal and Upper India, there are *I. pelops*, Hodgson, in the Himalaya, and *I. assamensis* (*M. assamensis*, M'Clelland, = *M. problematicus*, Gray, = *M. rhesosimilis*, Selater, P. Z. S. 1872, p. 495, pl. 25), originally described from Assam, and since obtained from the Bengal Sundarbans.|| It

\* [This remark seems applicable only to the females and young, for the adult males are well known to be very fierce. A full-grown *M. nemestrinus* is nearly as large and formidable as an ill-conditioned mastiff.—J.A.]

† "Travels in the East India Archipelago" (1868), p. 478.

‡ P. Z. S. 1868, p. 60, pl. vi.; also Selater, *ibid.* 1871, p. 221.

§ P. Z. S. 1862, p. 350, pl. xlii.; 1864, p. 711; 1870, p. 615, and woodcut.

|| "Supposed new Monkey from the Bengal Sundarbans," J. Anderson, M.D., P.Z.S. 1872, pp. 529-533, figure of skull and skull of *M. rhesus*.



is only quite recently that the distinctions of these animals have become tolerably understood. Even another of them has been described by M. Adolphe Milne-Edwards as *M. tchiliensis*,\* from "Tche-ly," which, to judge from the published figure of a female, is not unlikely to prove identical with *I. pelops*.† So far as known, the Pig-tailed Monkeys are the only representatives of the sub-group in the Indo-Chinese and Malayan countries; but another and kindred sub-group, indeed hardly separable, that of the Stump-tail Monkeys, has at least one Indo-Chinese representative.

#### 4. *INUUS SPECIOSUS*.‡

*Macacus speciosus*, F. Cuvier, Mamm. Lithog.; nec apud Temminck, Faun. Japon. t. 1; *M. arctoides*, Is. Geoffroy, Zoo. de Voy. de Belanger, 1830; Mag. de Zool. 1833, Mamm., t. 2; *M. brunneus*, Anderson, P. Z. S. 1871, p. 628; 1872, p. 628, pl. xii.

The brown Stump-tail Monkey, described by M. Isidore Geoffroy St.-Hilaire from Cochin-China, and since obtained in Káchár, and by Dr. Anderson in the Kákhyen hills to the East of Bhamo.

There are several nearly-allied species of Monkey with very short naked tail, and one in Japan in which the same kind of tail is fully clad. The latter was identified by Prof. Temminck with the *Macaque à face rouge*, *M. speciosus*, F. Cuvier, but it is not probable that the French zoologist should have obtained the Japanese species, and his figure applies much better to the present one, which he is far more likely to have received from Cochin-China. In this case the Japanese monkey might bear the name of *I. fuscatus*, formerly applied to it in the Leyden Museum. Together with living specimens of *I. speciosus*, as here recognized, there was received at the London Zoological Gardens a very similar monkey which, at first sight, appeared like a rufous individual of the same, but on minute comparison of the living animals it was adjudged to be different, and has been figured and

\* Recherches sur les Mammifères, p. 227, plates 32, 33.

† [*M. tchiliensis* is apparently the same monkey described by Dr. Gray (*l.c.*) as *M. lasiotus*.—J.A.]

‡ [Dr. Murie has identified a Macaque that lived in the Zoological Society's Garden, London, as an example of *M. speciosus*, F. Cuv. and Geoff. St.-Hil., and he has pointed out certain structural characters which separate it from a monkey which he has regarded as *M. arctoides*, Geoff. St.-Hil. This last-mentioned specimen had been described by Dr. Anderson as a new species under the name of *M. brunneus*. *M. arctoides* was characterized by Geoff. St.-Hilaire as "une espèce très distincte de la précédente (*M. speciosus*) par ses longs poils plusieurs fois annelés de brun et de roux-clair, . . ." and he also says that the black-faced *M. maurus* is separated by its uniformly brown hair from *M. arctoides*, which has well annulated hair, whilst *M. brunneus* has its hair of a uniform colour.—J.A.]



described as *Macacus rufescens*, Anderson.\* A second specimen of it has since been received. Its habitat is unknown. Another allied species, brown, with hair upon the head much lengthened, constitutes the *M. melanotus*, Ogilby;† habitat also unknown, as the assigned habitat of Madras cannot be accepted. M. Fred. Cuvier likewise figures *M. maurus* (*M. inornatus*, Gray, Proc. Zool. Soc. 1866, p. 202, pl. xix.), a dark and black-faced Monkey of the same group, which is believed to inhabit Borneo; and *M. ochreatus*, Ogilby (*M. ocreatus* apud Selater, Proc. Zool. Soc. 1870, p. 383, pl. lxxxii., and *M. fuscatus*, Schinz, apud Gray), is believed to come either from Celebes or one of the Philippines. The *Synopithecus niger* apud Gray (*M. niger*, Desm.), formerly supposed to inhabit Celebes, would appear now to be a Philippine species. There is much yet to be learned respecting the exact habitat, or the geographical range, of all of these various stump-tailed Monkeys. One of great size, *M. tibetanus*, Ad. Milne-Edwards,‡ has recently been described to inhabit "the coldest and least accessible forests of Eastern Thibet," and this one has the short tail clad as in the Japanese species.

#### \*5. MACACUS CYNOMOLGUS.

*Simia cynomolgus*, L.; *Macaque* of Buffon; *M. carbonarius*, F. Cuv., Mamm. Lithog.; Blyth, J. A. S. B. xvi. p. 732; *M. aureus*, Is. Geoff., Arch. Mus. tom. ii. p. 566, Bélanger's Voyage, Atlas, f. 2, golden rufous variety; *Cercopithecus cynosurus* apud Helfer. *Myouk-ta-nya*, Arakan.

Two mounted skins of the Crab-eating Monkey in the British Museum, erroneously marked from "India," represent the Burmese type, very inferior in colour, without any yellowish tinge, and having no trace of crest on the vertex; the face blackish in the living animal, with strongly contrasting white eye-lids, as in the African Monkeys known as Mangabeys. As seen alive together with the ordinary crested race of the Malayan peninsula and islands (*Aigrette* of Buffon, *Simia aigula*, L., *S. fascicularis*, Raffles, *M. cristatus*, Gray, founded on an albino!), there is considerable contrast of appearance, although the skulls are not distinguishable;§ the face of the latter is much less dark, and the colouring of the upper parts is mostly yellowish. The Philippine race (*M. palpebrosus*, Is. Geoff.) resembles it, but is considerably darker in hue; and a living specimen received from Siam in the London Zoological Gardens is like the Philippine race, but with the face as pale as in *M. radiatus* of Southern India. Another monkey of the kind recently examined,

\* P. Z. S. 1872, pp. 204, 495, and pl. xxiv.

† *ibid.* 1839, p. 31.

‡ Recherches sur les Mammifères, p. 244, plates 34, 35.

§ The skulls of two adults from Arakan are described in J. A. S. B. vol. xiii. p. 474.



from an unknown locality, is brightly tinged with yellowish above, but has no trace of crest on vertex, the hair of the crown lying very flat, and the face is but slightly infuscated. *M. carbonarius*, F. Cuv., is asserted to be from Sumatra; and upon a casual individual variety from Pegu M. Is. Geoffroy founded his *M. aureus*, which he elsewhere states to inhabit Sumatra and "vraisemblablement Java." Moreover, according to M. Bélanger, the orange-coloured *M. aureus* is commonly to be purchased in Calcutta, which decidedly is not the case. Major Berdmore sent the skin of a young example of the same occasional variety from Mergui; but it can be safely asserted that there is no established race of such a colour, like the Patas monkey, *Cercopithecus ruber*, of Abyssinia. *M. philippinensis*, Is. Geoff.,\* is founded on a crestless albino, which has assuredly no claim to be regarded as a peculiar species. Another figure of a mature albino given by Crawford in his "Embassy to Siam and Cochin-China," one of a couple of such animals he saw at Bangkok, well represents the Burmese race without a trace of top-knot. The Monkeys of this type are so commonly conveyed about from port to port, not only in European but in native vessels, that erroneous localities are apt to be assigned to specimens; but it is certain that no long-tailed Monkey of the group with fully haired forehead inhabits the region westward of the Bay of Bengal. How far northward of Akyab the *M. cynomolgus* extends its range has yet to be ascertained, but it may be safely averred that there is no such animal in the Bengal Sundarbans. The corresponding Indian sub-type, exemplified by *M. radiatus* of S. India, brown with pale face, and *M. pileatus* of Ceylon, rufous with dark face, has a semi-nude forehead and longish hair on crown radiating from a centre. This sub-type does not occur eastward of the Bay of Bengal, though a living specimen of *M. radiatus* was sent from Formosa by Mr. Swinhoe,† who then—mistaking it for his subsequently described *Inuus cyclopis*—believed that it inhabited the camphor forests of the interior of that island. In his "Catalogue of the Mammals of China, inclusive of those of Formosa,"‡ he makes no reference to such a species. Upon certain of the Nicobar Islands the Aigrette Monkey has been probably introduced, as, according to the Abbé de la Caille, it was in the Mauritius by the Portuguese. There it had become numerous in the last century, and its habits, in a state of freedom, as observed upon that island, are described in Grant's "History of the Mauritius," published in 1801. In all probability the present Philippine race is not indigenous to that great archipelago.

\* Arch. du Museum, ii. p. 568, t. 33.

† J. A. S. B. xxix. note to p. 88.

‡ P. Z. S. 1870, p. 615.





## Fam. Colobidæ.

Long-tailed Monkeys, which have no cheek-pouches, the stomach sacculated, and which subsist to a considerable extent on green foliage.

## \*6. PRESBYTES CRISTATUS.

*Simia cristata*, Raffles; *Semnopithecus pruinus*, Desmarest; *S. phayrei*, Blyth, J.A.S.B. xvi. p. 733; *S. argentatus*, Bl., MS., Horsfield's Catalogue, No. 8. *Myouk-huyo*, Arakan.

The Silvery-leaf Monkey inhabits Arakan, Tenasserim provinces, Malayan peninsula, Sumatra, Banka, and Borneo.

Of a somewhat glistening or silvery dark ash colour, with white underparts; a conspicuous crest on the vertex, and long whisker-tufts, which conceal the ears on a front view; face leaden black, contrasting with pinkish flesh colour on the mouth and lips, extending to the lining of the nostrils, besides which a large semi-circular mark of a paler and more livid tint occupies the inner half of each orbit. Three small living young sent from Ramri Island by Captain J. R. Abbott were quite similar in colouring to the adults, showing no trace whatever of rufous; but *P. cristatus* is described to have the young bright rufous, as in some of the allied species, and certainly the figure assigned to the young of *P. cristatus* in the great Dutch work by Professor Temminck and Dr. S. Müller, represented of a rufous colour, and with ears conspicuously visible on a front view of the face, can hardly refer to the Arakan species, which nevertheless appears to be true *P. cristatus*. Writing of *P. obscurus* and *P. melanopus* (*P. albo-cinereus* apud Schinz), in the Malayan peninsula, Dr. Cantor remarks that "both attain to the same size, have in common the shape of the body, the white marks on the face, and the general distribution of colour;" while of *P. cristatus* he states that "the whitish colour on the eyes and mouth is present, though less distinct than in the preceding two species."\* Those markings, however, could not be more conspicuously so than in the three young examples from Ramri already noticed, one of which is now mounted in the India Museum, London.

A species is referred to *P. albocinereus* by Dr. Anderson, as being "common on the banks of the Tapeng;"† and *P. albocinereus* of the Malayan peninsula apud Schinz and Cantor must bear the name *P. melanopus*, Geoff. (*Semnopithecus siamensis*, S. Müller, = *S. nigrimanus*, Is. Geoffroy, = *S. cinereus*, Gray, and the young *S. dorsatus*, Waterhouse). It occurs commonly in collections from Malacca, and as it has been received from Siam, it is likely to occur in the Tenasserim provinces. One distinguishing character

\* J. A. S. B. xv. p. 175.

† "Report of Expedition," etc., p. 271.



of it is that it has two lateral radiating centres of hair upon the crown, the hair meeting and being pressed upwards between them. The small young resemble the adults, excepting that their colours are more strongly contrasted.

#### 7. PRESBYTES OBSCURUS.

*Simnopathicus obscurus*, Reid, P. Z. S. 1837, p. 14; *S. leucomystax*, Tem.; *Simia maura* apud Raffles; *S. albocinereus*, Is. Geoffroy; *S. halonifer*, Cantor; probably *S. maurus* apud Helfer; ? *S. sumatranus*, S. Müller, apud Schinz; *S. cristatus* in the Atlas to "Voyage au pôle sud," t. 3. *Myook-myet-gwen-phyoo* (Mason).

The Dusky-leaf Monkey is the most common species of the genus in the Malayan peninsula, from which its range extends at least to the province of Mergui, where it was obtained by the late Major Berdmore. It has also been received from Siam, and is likewise an inhabitant of Sumatra, if not also of Borneo. The adults are blackish, with hair upon the nape lengthened and conspicuously whitish. The newly born young are of a vivid golden-ferruginous colour, which soon changes to dusky-ash, and is continued latest upon the tail.\* This may be the species which Mason refers to as being "found, in considerable numbers, in the interior" of the Tenasserim provinces; but, he adds, "it is not so numerous as the other Monkeys and the Gibbons." He also remarks that "the large flowers of the *Dillenia*, and many others, are much sought after by these monkeys as food."

#### 8. PRESBYTES CHRYSOGASTER.

*Simnopathicus chrysogaster*, Lichtenstein; *S. potenziiani*, C. L. Bonaparte, apud Peters, P. Z. S. 1866, p. 429.

The mounted skins of an adult female and young, procured by Helfer somewhere in the Tenasserim provinces, are in the Berlin Museum. By the courtesy of Professor W. Peters I have been favoured with coloured drawings of those specimens. The mature animal has the upper parts, limbs, and tail blackish, the hairs ferruginous on the basal half; slight band crossing the forehead, cheeks, front, throat, and front of neck, sullied white; rest of the lower parts deep and bright ferruginous, which tinges the inner side of the limbs; face colourless, or pinkish white. Young wholly pale ferruginous, somewhat darker on the hands and feet. There is a slight compressed crest on the vertex, but no distinct whisker-tufts, or lengthened hair on the nape. It is highly probable that some adults are wholly ferruginous, as happens with *P. maurus* in Java (the so-called *S. pyrrhus*, Horsf., = *S. auratus*, Geoff.), and with *P. melalophus* in Sumatra,

\* J. A. S. B. xvi. p. 734.



the so-called *P. nobilis*, Gray; while it is likely that there is a melanoid phase of *P. rubicundus* of Borneo.\*

Before seeing the coloured drawings sent by Professor Peters, I suspected that *P. chrysogaster* would prove identical with *P. pileatus*, Blyth,† which is common in the hills bordering on Sylhet and those of Tippera and Chittagong, and the old males of which are deeply tinged with ferruginous on the lower parts. Females and young have the lower parts white or but faintly tinged with ferruginous, and the rest of the coat is of a pure grey, the face black, and there is no crest, but the hairs of the crown are so disposed as to appear like a small flat cap laid upon the top of the head. The old males seem always to be of a deep rust colour on the cheeks, lower parts, and more or less on the outer side of the limbs; while in old females this rust colour is diluted or little more than indicated. A mature male which I possessed alive was an exceedingly gentle animal, and the species is akin to *P. maurus* of Java, though so different in colouring. It is likely to occur in the northern part of Arakan.

#### 9. PRESBYTES BARBEI.

*Presbytes barbei*, Blyth, J. A. S. B. xvi. p. 374.

This species is closely allied to, if not identical with, *P. femoralis*, Horsfield (= *P. chrysomelas*, Tem.), of the Malayan peninsula and Sumatra, the female of which is figured of a brown colour by MM. Temminck and S. Müller; but adults of both sexes described as *P. barbei*, from skins, minus the skull, procured in the interior of the Tippera hills, were black. The colour is probably variable. According to Cantor, the face during life is intense black, except the white-haired lips and the chin, which are of a milk-white colour. It is another likely species to occur in the Indo-Chinese region; and from the Malayan peninsula Dr. Cantor gives four species of this genus, viz. *P. cristatus*, *P. femoralis*, *P. obscurus*, and *P. melanopus*; while the remarkable and very handsome *P. nemæus* was observed plentifully in Cochin-China by Crawford, whence also has lately been described and figured *P. nigripes*, Ad. Milne-Edwards.‡ M. Milne-Edwards, jun., has also figured and described *Rhinopithecus roxellana*, a very remarkable animal of this group from the same forests of Eastern Tibet as are inhabited by *Macacus tibetanus*.

\* In the Calcutta Museum there is a brown specimen of the common *P. cephalopterus* of Ceylon.

† J. A. S. B. xii. p. 174, xiii. p. 467, xvi. p. 735.

‡ Nouv. Arch. du Mus., tom. vi., Bulletin p. 7, t. 1.





## Sub-order LEMURIA.

## Fam. Nycticebidæ.

## \*10. NYCTICEBUS TARDIGRADUS (J. 10).

*Nycticebus tardigradus*, F. Cuv., *N. bengalensis*, Geoffroy; "Sloth" of Anglo-Indians, and doubtless, therefore, "the little *Bradypus*" of Helfer.\* *Myouk-moung-ma*, "Monkey's concubine," Mason.

The Slow Loris is generally diffused, but from its habits not much observed. The range of this genus extends to Eastern Bengal, and I have been assured, on good authority, that it inhabits the island of Préparis, though it has not been met with either in the Andaman or Nicobar Islands. Vosmaer's figure (1770) of his "Bengaalschen Luiaard" very well represents the race inhabiting Sylhet and Arakan. In Malacca it is more deeply coloured; and M. Ad. Milne-Edwards separates that of Siam and Cochin-China by the name *N. cinereus*.†

## Sub-order PLEUROPTERA.

## Fam. Galeopithecidæ.

## 11. GALEOPITHECUS VOLANS.

*Lemur volans*, L.; *Vespertilio admirabilis*, Bontius; figured in Marsden's "History of Sumatra," pl. ix. *Myook-hloung-pyau*, i.e. embryo-monkey flying, Mason.

The range of the Cobego, a very remarkable but common Malayan animal, extends certainly to Mergui, where skins of it were procured by Major Berdmore; but Mr. Dunn states that he possessed a living specimen that was obtained about one hundred miles up the Koladyne river, which flows from the North into Akyab harbour! He was moreover positive about the correctness of the identification.‡ According to Sir T. Stamford Raffles, writing in 1820, "this animal, the *kuburg* of the Malays, is too well known to require description. It usually hangs from the branch of a tree suspended by its four hands. . . . Mr. Marsden's figure gives a very good idea of this animal."§ Mr. Wallace remarks that "it is sluggish in its motions, at least by day, going up a tree by short runs of a few feet, and then stopping a moment as if the action was difficult. It rests during the day, clinging to the trunks of trees, where its olive or brown fur, mottled with irregular whitish spots and blotches, resembles closely the colour of mottled bark, and no doubt helps to protect it. Once,

\* J. A. S. B. vii. p. 859.

† Ann. Sc. Nat. 1837, vii. p. 161, Nouv. Arch. de Museum, iii. Bulletin p. 9, pl. 3.

‡ P. Z. S. 1863, p. 370.

§ Tr. Lin. Soc. xiii. p. 248.



in a bright twilight," he adds, "I saw one of these animals run up a trunk in a rather open space, and then glide obliquely through the air to another tree, on which it alighted near its base, and immediately began to ascend. I paced the distance from one tree to the other, and found it to be seventy yards; and the amount of descent at not more than thirty-five or forty feet, or less than one in five. This I think proves that the animal must have some power of guiding itself through the air; otherwise in so long a distance it would have little chance of alighting exactly upon the trunk. Like the *Cuscus* of the Moluccas, the *Galœopithecus* feeds chiefly on leaves, and possesses a very voluminous stomach and long convoluted intestines. The brain is very small, and the animal possesses such remarkable tenacity of life, that it is exceedingly difficult to kill it by any ordinary means. The tail is prehensile, and is probably made use of as an additional support when feeding. It is said to have only a single young one at a time, and my own observation confirms this statement, for I once shot a female, with a very small blind and naked little creature clinging closely to its breast, which was quite bare and much wrinkled, reminding me of the young of marsupials, to which it seemed to form a transition. On the back, and extending over the limbs and membrane, the fur of these animals is short, but exquisitely soft, resembling in its texture that of the Chinchilla."\* Raffles, however, states that it produces two young at a time, and Mr. A. Adams, who accompanied Sir E. Belcher in the exploring voyage of H.M.S. "Samarang," found two young in one which he dissected. He observed this animal "both in Borneo and Basilan in a wild state. It is crepuscular," he adds, "and hangs suspended during the day to the under surface of boughs in the tops of high trees. When it moves, it seems to shuffle and scramble among the leaves, and sometimes drops suddenly from its elevated position. It feeds on leaves, and the stomach of one I examined was filled with the remains of the foliage of *Artocarpus* and other trees. At Sarawák I had a living Cobego in my possession, which was procured on the occasion of felling some trees, in the top of one of which the animal was suspended. It was very inactive on the ground, and did not attempt to bite or resist."† "In several shot on the hill at Pinang," remarks Dr. Cantor, "the stomach" contained vegetable matter, but no remains of insects. In confinement, plantains constitute the favourite food, but deprived of liberty the animal soon pines and dies."‡

\* Wallace's "Travels in the Malay Archipelago," vol. i. p. 135.

† Notes, etc. (1848), p. 265.

‡ J. A. S. B. xv. p. 178.



According to Horsfield, the Cobego "lives entirely on young fruits and leaves; those of the cocoa-nut and of *Bombax pentandrum* are its favourite food, and it commits great injury to the plantations of these, which surround the villages of the natives" of Java. In that island it is "confined to particular districts, where it is met with chiefly on isolated hills, covered with a fertile soil, and abounding with young luxuriant trees, the branches of which afford it a safe concealment during the day. As the evening approaches, it leaves its retreat, and is seen in considerable numbers making oblique leaps from one tree to another; it also discovers itself by a croaking, harsh, disagreeable noise. If an individual is forced from its usual abode, it advances by slight awkward leaps, until it meets with an object on which it can ascend by its claws."

This animal occurs in Siam, and is probably far from rare in the valley of the Tenasserim river. By some zoologists it is referred to the order or sub-order *Insectivora*; although, it would seem, to no extent an insect-eater, according to all trustworthy observation.

## Order CHIROPTERA.

### Tribe HARPYDIA.

Harpies or Roussettes; Frugivorous Bats which do not hybernate, and are peculiar to warm climates. They have no American representatives.

### Fam. Pteropodidæ.

#### \*12. PTEROPUS MEDIUS (J. 12).

*Pteropus medius*, Temminck, Monog. i. p. 176; *Pteropus edwardsii*, Geoffroy, Ann. Mus. xv. p. 192 *partim*, apud Peters. *Len-hwai* or *Len-wet*, Mason.

The common Indian Roussette, or "Flying-fox."

Some of the larger species of this genus are by no means well defined apart, if really differing to an extent which should be regarded as specific. Prof. Peters has elaborately monographed the genus *Pteropus*,\* and subsequently the rest of the family,† of which he recognizes ten genera. He admits twenty-six species, with two sub-species, of *Pteropus* as then known to him. The ordinary Indo-Chinese Roussette is the same as the Indian one, and wherever found varies to some extent in colouring, the back being more or less

\* "Bericht der Akademie zu Berlin," May 27th, 1867.

† *ibid.* Dec. 19th, 1867.



pale and the lower-parts more or less suffused with black or wholly fulvous; but in the Southern Tenasserim provinces it seems to grade into the more deeply-coloured *P. edulis* of Peron and Lesueur, as figured in Horsfield's "Zoological Researches in Java," which is recognized as distinct by Professor Peters, who refers to it *P. edulis et javanicus*, Desm., *P. edulis*, *funereus*, *et pluto*, Tem., *P. nicobaricus*\* and *Pachysoma giganteum*, Fitzinger. It is probable, therefore, that the latter, if truly distinct, should be recognized as an inhabitant of the Tenasserim provinces; but I suspect that it will be found to grade into the other.

13. CYNONYCTERIS AMPLEXICAUDATA (J. 13).

*Pteropus amplexicaudatus*, Geoff., Ann. and Mus. xv. p. 96; Peters, in P. Z. S. 1871, p. 513; *P. leschenaultii*, Desmarest; *P. seminudus*, Kelaart.

Tenasserim provinces, Siam, Amoy, Formosa, S. India and Ceylon, Malay countries to Timor, Moluccas, Philippines.

14. EONYCTERIS SPELÆA.

*Eonycteris spelæa*, Dobson, Journ. As. Soc. B. 1873, p. 204; *Macroglossus spelæus*, Dobson, J. A. S. B. xl. pl. x. fig. 3, 4, p. 261.

Tenasserim, Siam.

The habit of resorting to caves implied by the specific name of this kioidote has not, that I am aware of, been previously remarked of any of the family, but is likely to be common to sundry of the smaller *Pteropodidæ*. [Specimens of *Cynonycteris amplexicaudata* have since been obtained by Mr. W. T. Blanford, in the Némakdun Salt Caves, Kishm Island, in the Persian Gulf.]†

[15. MACROGLOSSUS MINIMUS.

*Steropus minimus*, Geoff. Ann. du Mus. xv. p. 96 (1810); *Steropus rostratus*, Horsf. Zool. Research. in Java (1825); *Macroglossus minimus*, Temminck, Monogr. Mammal. ii. p. 96; Horsf. Cat. Mamm. Mus. E. I. Comp. p. 29; Blyth, Cat. Mamm. Mus. As. Soc. Beng. No. 57; Dobson, J. A. S. B. 1873, p. 205.

A specimen in the Indian Museum, Calcutta, was obtained by Major Berdmore in 1858, in the valley of the Sitang river, Tenasserim province. This, the smallest species of frugivorous bat, has a rather wide distribution, extending from the Himalaya to North Australia.]

\* [*Pteropus nicobaricus*, Dobson, J. A. S. B. 1873, p. 198. Quite distinct from both *P. edulis* and *P. medius*.—G.E.D.]

† [Dobson in P. A. S. B. May, 1873, p. 110.]



\*16. *CYNOPTERUS MARGINATUS* (J. 14).*Vespertilio marginatus*, B. H.

A common and very generally diffused species, inhabiting, it would seem, everywhere that bananas grow in S.E. Asia and its islands.

Its flight is particularly light and buoyant, and is performed by rapid movement of the wings, as it hovers around a fruit-tree, being quite unlike the slow winnowing motion of the wings of the larger "Flying-foxes." Both, however, travel to vast distances in the course of a night's foraging.\* The neck and sides of this Bat are often strongly tinged with bright ferruginous, which would appear to indicate full maturity.† It is an extraordinarily voracious feeder, and will devour more than its own weight at a meal, voiding its food apparently but little changed while still slowly munching away. Of the guava, though a soft mellow fruit, it swallows only the juice, opening and closing its jaws very leisurely in the act of mastication, and rejecting the residue. A pair have now been living for some time, and have reared a young one, in the London Zoological Gardens, where also the larger species of this family thrive and propagate freely. A species from the Andamans is described as *C. brachysoma*, Dobson.‡

## Tribe SPECTRA.

Insectivorous Bats chiefly, which hybernate where the temperature is low. *Len-no*, Mason.

## Sub-tribe PACHYURA.

Thick-tailed Bats; the tail more or less protrusile and sheathing within the interfemoral membrane; the wings long and narrow, and contracting with a double flexure.

*Fam. Noctilionidæ.*

## Thick-tailed Bats.

17. *TAPHOZOUS THEOBALDI*.

*Taphozous theobaldi*, Dobson, P. A. S. B. 1872, p. 152; *T. saccolaimus* of Burma, *passim*.

Tenasserim provinces.

\* *vide* Hutton, P. Z. S. 1872, p. 693.

† [I have observed this in adult females only, and believe it to be a secondary sexual character, like the epaulets in *Epomophorus*.—G.E.D.]

‡ J. A. S. B. xl. p. 260.



18. *T. LONGIMANUS* (J. 31).*Taphozous longimanus*, Hardw. Trans. Lin. Soc. vol. xiv. tab. xvii. p. 525.

Rangoon.

This animal is pale fulvescent when young, and becomes gradually blacker with age; the very old being somewhat of a deep black, but with base of fur white.

19. *T. MELANOPOGON* (J. 32).*T. melanopogon*, Tem.

[The Indian Museum possesses a specimen of an adult male of this species (with the characteristic black beard well developed), received from Amherst, in Lower Burma.]

Other species are sure to occur in Burma, and very probably the *Cheiromeles torquatus*, Horsfield, a large naked bat akin to *Taphozous*, with a narrow collar of hair, and the pollux somewhat opposable, which was procured by Finlayson in Siam, and also inhabits Malacca, Borneo, and Java. It emits a highly offensive odour. *Cheiromeles* conducts to *Nyctinomus* (see *Dysopes*), and of this genus *N. plicatus* may be confidently looked for, and to the south probably the darker race described as *N. tenuis*, Horsfield, which occurs in the Malay Peninsula. Also *Nyctinomus johorensis*, Dobson,\* from Johore in the Malay Peninsula. Of a larger species, *N. insignis*, Blyth,† which Mr. Swinhoe identifies with the African *N. ruppellii*, and which should therefore occur in other parts of Southern Asia, he remarks, "I have often, on a cloudless evening, at Amoy, seen these Bats flying along high in the air, being easily distinguished by the narrowness of their wings. When irritated," he adds, "the creature has a habit of exposing its tail, and of sinking its eye into the socket and thrusting it out again. The membrane extending from the tail to the legs is wrinkled, and covers the tail like a glove, so as to slip up or down as the creature wishes to expand or contract its interfemoral wing, or, in nautical language, to shake out or take in reefs."‡ In *Taphozous* the tail withdraws entirely within the membrane.§ [I have compared the specimen labelled *N. insignis* in the

\* P. A. S. B. Jan. 1873, pp. 22, 23; *Nyctinomus* (Chærephou) *johorensis*, J. A. S. B. 1874, p. 144.

† Cat. Mam. Mus. As. Soc. Bengl. No 87.

‡ P. Z. S. 1870, p. 619-690.

§ A classification of the genera of *Chiroptera*, by Prof. W. Peters, is published in the *Monatsbericht der Königl. Akademie der Wissenschaften zu Berlin*, May 22nd, 1865,



Indian Museum, Calcutta, with *N. cestonii*, Savi, of Southern Europe, and can find no difference whatever. That specimen was sent from Amoy by Mr. Swinhoe, and may therefore be safely assumed to be identical with the specimen referred by him to *N. ruppellii*.—G.E.D.]

[Mr. Blyth has followed the example of other Zoologists in placing *Rhinopoma* next *Megaderma*. Although connected with *Megaderma* through *Nycteris*, I believe that this genus is much more allied to *Taphozous*, and should therefore be classed with the *Noctilionidæ*.—G.E.D.]\*

### Sub-tribe LEPTURA.

Bats with ample wings, which contract with double flexure; the tail (when present) slender and fixed in the interfemoral membrane.

### Fam. Megadermatidæ.

#### 20. RHINOPOMA HARDWICKII (J. 30).

*Rhinopoma hardwickii*, Gray.

India, Indo-Chinese, and Malayan countries.

p. 256. In this classification his fifth family, BRACHYURA, comprises *Mysticina*, *Noctilio*, *Taphozous*, *Emballonura*, *Diadidurus*, and *Furia*; and his sixth family, MOLOSSI, is composed of *Molossus* (seu *Nyctinomus*) and *Cheiromeles*. They seem to range better as two sub-families of *Noctilionidæ*, *Cheiromeles* having so much affinity with *Taphozous*. Prof. Peters recognizes in all six families of Bats, which are named by him as follow:—1. PTEROPI = *Pteropodidæ*.—2. MEGADERMATA = *Megadermatidæ* (comprising *Rhinopoma*, *Megaderma*, *Nycteris*, and *Nyctophilus*, all foreign to America).—3. RHINOLOPHI = *Rhinolophidæ* (also foreign to America).—4. VAMPYRI = *Vampyridæ* (with four subfamilies, exclusively American).—5. BRACHYURA.—6. MOLOSSI.—7. VESPERTILIONES = *Vespertilionidæ* (with fourteen genera). In *Bericht der Akademie zu Berlin*, 1871, p. 301 *et seq.*, the same zoologist has supplied a monograph of the *Rhinolophidæ*, in which he recognizes twenty-nine species of *Rhinolophus*, twenty-four of *Phyllorhina*, and as a third genus only one known species, the *Celops Frithii*, nobis.

\* [I do not agree with the author in placing *Rhinopoma* in the same family with *Megaderma*. *Rhinopoma* is, in my opinion, closely related to *Taphozous*. Its connexion with that genus is shown in the peculiar frontal depression, in the projecting muzzle and valvular nostrils, in the weak and deciduous upper incisors, in the form and folding of the wing, in the production of the tail beyond the interfemoral membrane, and even in the microscopical structure of the hair. Further, the species of these genera show remarkable similarity in their habits, and in them an enormous deposit of fat is heaped up about the root of the tail immediately before the hibernating season. Similar deposits of fat have not been observed by me in any other genera of Chiroptera.—G.E.D.]



21. *MEGADERMA SPASMA*.

*Megaderma spasma*, L.; *M. horsfieldi*, Blyth, Catal. No. 60; Horsfield's Catal. No. 39.

Tenasserim provinces.

The true *M. spasma* inhabits Ceylon and the Malayan countries generally; and the Indian *M. lyra* can hardly but occur in Arakan and Pegu, as it has been obtained at Amoy and in Formosa. The Bats of this genus are highly predatory, and Col. McMaster records that at Rangoon one killed on successive occasions two canary-birds. *Nycteris javanica*, Geoff., inhabits the Malayan peninsula, and should be looked for in the Tenasserim provinces.

Fam. *Rhinolophidæ*.

Sub-fam. RHINOLOPHINA.

Horse-shoe Bats.

22. *RHINOLOPHUS CÆLOPHYLLUS*.

*Rhinolophus celophyllus*, Peters, Proc. Zool. Soc. 1866, p. 426, and pl. 35.

Obtained by the late Lieut. Beavan in the valley of the Salween.

23. *R. LUCTUS* (J. 17).

*Rhinolophus luctus*, Temminck.

Indo-Chinese and Malayan countries, India (to lower region of the Himalaya), China, Philippines.

According to Captain Hutton, "this fine species commences its flight rather early in the evening, and does not soar high, like the smaller Bats in general, but remains below at about from twenty to thirty feet from the ground, wheeling with a somewhat heavy and noiseless flight around buildings and large trees in search of beetles and other insects. Indeed," he adds, "I think it may be truly said of all the larger species of" insect-eating "Bats, that they hawk for prey in the lower regions of the atmosphere, while nearly all the smaller ones ascend; and the reason is, that while the flies and minute insects are in the higher regions, the large beetles and other large insects, of which the smaller Bats could make no use, are found below among the branches of the trees. *R. luctus* appears usually to dwell in pairs, and does not associate in communities like some of the smaller species of its genus—though in a large cavern, affording ample room for them to dwell apart, several pairs may sometimes be found. I have taken them from the roofs of outhouses, and in wide caves in limestone rocks; but they appear to fly only in the warmer months of summer,





remaining (at least such is the case at Másuri) in a semi-torpid state during the winter. It is possible, however, that in the warmer south-eastern climates of Sikhim and the Khásia hills they may be active likewise in the winter," as where winter is unknown.\*

24. *R. AFFINIS* (J. 21).

*Rhinolophus affinis*, Horsfield, Zool. Res. Java, pl. 8, fig. A. B.

Indo-Chinese and Malayan countries; also Malabar and Ceylon, and not uncommon at Másuri, at an elevation of about 5000 to 6000 feet.†

"Like the preceding" (*R. luctus*), remarks Capt. T. Hutton, "this species is early on the wing, and may be seen in the evening twilight coursing slowly round the trees in search of insects, crunching the hard-winged beetles as it flies, with a sharp crackling sound. It flies so low as to be easily caught in a common butterfly net."

25. *R. ROUXI* (J. 22).

*Rhinolophus rouxi*, Temminck, Monog. ii. p. 306.

India, with Ceylon; Indo-Chinese countries; China.

26. *R. PUSILLUS*.

*Rhinolophus pusillus*, Temminck; *R. pusillus*, Dobson, Proc. As. Soc. B. 1872, p. 155.

Burma.

As a matter of course, other species remain to be observed. *R. minor*, Horsf., originally described from Java and common in the Malay countries, is also common at Másuri, at from 4000 to 6500 feet elevation.‡

Sub-fam. PHYLLORHININA.

27. *PHYLLORHINA DIADEMA*.

*Rhinolophus diadema*, Geoff.; Peters, in Proc. Zool. Soc. 1866, p. 426; *R. nobilis*, Horsfield, also Cantor; *Hipposideros lankadiva*, Kelaart.

Indo-Chinese and Malayan countries, Moluccas and Philippines, Ceylon.

The allied *P. armiger*, Hodgson, *H. diadema* apud Cantor, nec Geoffroy, and *H. swinhoii*, Peters, *olim*, must needs also occur, as it inhabits the Lower Himalaya, Ceylon, Malacca, and S. China (Amoy). Hutton remarks of it that, "like *Rhinolophus affinis*, this species may frequently be heard during its flight cracking and crunching the hard wings of beetles, which in the

\* P. Z. S. 1872, p. 695.

† Hutton, *l.c.* p. 696.

‡ Hutton, *l.c.* p. 698.





evening hours are usually abundant among the trees. The teeth are strong, and the *tout-ensemble* of its aspect is not unlike that of a bull-dog."\*

[28. *P. MASONI*.

*Phyllorhina masoni*, Dobson, J. A. S. B. 1872, p. 338.

This fine species, very similar to *P. diadema*, but differing from it in the form of the concave front surface of the transverse nose-leaf, which is divided into *two cells only* by a single central longitudinal ridge, has been found at Moulmain, and the single type specimen is in the Indian Museum, Calcutta. Closely allied to it, but much smaller, is *P. nicobarensis*, Dobson, from the Nicobars.†]

[29. *P. LARVATA*.

*Phyllorhina larvata*, Horsfield; Zool. Researches in Java.

Prome, Burma.‡

Extremely variable in the colour of the fur.]

[30. *P. SPEORIS* (J. 26).

*Vespertilio speoris*, Schreb. Säugeth. Suppl. Atlas.

A specimen of this species was found by me among several specimens of *P. larvata* collected by Dr. Anderson at Prome, Burma, during the first expedition to Yunan.—G.E.D.]§

31. *P. BICOLOR*.

*Rhinolophus bicolor*, Temminck, Monog. ii. p. 18, t. 32, fig. 9, 10; *Hipposideros fulvus*, Gray, Peters, Proc. Zool. Soc. 1871, p. 513, *vide* Dobson in P. A. S. B. 1872, p. 155.

*P. bicolor* inhabits the Malayan countries and Philippines, and was obtained by Hutton in the Deyra Doon and hills up to 5500 feet.

According to Mr. Dobson, the golden-coloured specimens examined proved to be pregnant females exclusively. Examples so coloured occur in several species both of *Rhinolophus* and *Phyllorhina*.||

\* *vide* P. Z. S. 1872, p. 701.

† [J. A. S. B. 1871, p. 263.]

‡ [*vide* Dobson in P. A. S. B. 1872, p. 155.]

§ [The specimens preserved in the Indian Museum, Calcutta, corresponding to Catal. no. 77 (old coll.), are undoubtedly examples of *P. larvata*, Horsf.—G.E.D.]

|| Cantor remarks, of two individuals of *Rhinolophus affinis*, "the male is reddish-brown above, light greyish brown beneath; the female is above golden-fulvous, which becomes lighter on the lower-parts."—J. A. S. B. xv. p. 181.



Others doubtless remain to be discovered in the Indo-Chinese countries, inclusive of *Calops frithii* (J. 29).

### 32. *ASELLIA STOLICZKANA*.

*Asellia stoliczkana*, Dobson; P. A. S. B. May, 1871, p. 106; J. A. S. B. vol. xl. p. 263; *Phyllorhina trifida*, Peters; P. Z. S. June, 1871, p. 513.

Specimens were obtained by Dr. F. Stoliczka and Mr. F. Day at Penang.

## Fam. Vespertilionidæ.

### Ordinary Bats.

### \*33. *NYCTICEJUS LUTEUS* (J. 43).

*Nycticejus luteus*, Blyth, J. A. S. B. vol. xx. p. 167; *Scotophilus heathii*, apud Swinhoe, P. Z. S. 1870, p. 619.

Arakan, and probably the rest of British Burma, unless far to the southward. "Very common in Canton in April and May." \*

### \*34. *N. TEMMINCKII* (J. 44).

*Vespertilio temminckii*, Horsfield.

Generally diffused, except probably at high elevations. One of the most abundant of Bats throughout India up to the base of the Himalaya, as well as in the Indo-Chinese and Malayan countries, and the South of China.

### 35. *N. CASTANEUS* (J. 45).

*Nycticejus castaneus*, Gray.

This species or race, which merely differs from the last in having the under-parts nearly or quite as deeply coloured as the upper-parts, has been obtained at Dacca, although chiefly a Malayan race or variety. Jerdon refers to it as inhabiting Burma. Others are likely to occur, especially of small size, and not improbably the large and singularly adorned *N. ornatus* which has been received from the Khásia hills.

[I believe both *N. luteus* and *N. castaneus* are synonyms of *N. temminckii*. *N. luteus* is the perfectly adult *N. temminckii*. No difference whatever, except size, can be found on comparing recent specimens and skeletons. Specimens of *N. ornatus*, Blyth, were obtained by Dr. Anderson in the Kakhyen Hills, Yunan.—G.E.D.]

\* Swinhoe, l.c., vide also Hutton, P. Z. S. 1872, p. 706.



\*36. *VESPERUGO IMBRICATUS*.

*Vespertilio imbricatus*, Horsfield; "young probably *V. abramus*, Tem., and *V. lobatus*, Gray; probably adult of *V. coromandelianus*, F. Cuv.," Dobson, in P. A. S. B. 1872\* p. 156).\*

A minute species, about the commonest and most generally diffused of Bats from the base of the Himalaya to Ceylon, as likewise in the Indo-Chinese and Malayan countries, and the South of China. It has also been recorded from Persia.† When disturbed in a room its flight is so exceedingly rapid that it can hardly be followed by the sight.

37. *TYLONYCTERIS PACHYPUS*.

*Vespertilio pachypus*, Temk., Monog. Mamm. ; *Scotophilus fulvidus*, Blyth, J. A. S. B. vol. xxviii. p. 293 ; *Vesperus pachypus*, Dobson, P. A. S. B. 1871, p. 212 ; *Tylonycteris pachypus*, Peters, Monatsb. Akad. Berl. 1872, p. 704.

Tenasserim provinces.

38. *KERIVOULA PICTA* (J. 53).

*Vespertilio pictum*, Pallas.

This very beautifully coloured little Bat, as seen alive or quite fresh, occurs in British Burma, as in the adjacent parts of S.E. Asia.

[\*39. *VESPERTILIO HASSELTII*.

*Vespertilio hasseltii*, Temm. Monog. Mammal. ii. p. 225 ; *Vesperugo hasseltii*, Wagner, Suppl. Schreb. Säugeth. v. p. 740.

This large-footed bat belonging to the same section of the genus (Subg. *Leuconoë*, Boie) as *Vespertilio capaccini*, Bonap., is readily distinguished from all other allied species by the very small size of the second lower premolar and its position quite internal to the tooth-row. Dr. Peters, who first detected the presence of this small premolar, remarks that the species was long considered as *Vesperugo* on account of the supposed absence of this tooth.§ Tenasserim province, Sumatra and Java.]

40. *V. BERDMOREI*.

*Myotis berdmorei*, Blyth, J. A. S. B. xxviii. p. 293.

A small species, akin to the European *V. pipistrellus*, obtained by the late Major Berdmore in the valley of the Sitang. "Of a dark fuscous hue,

\* Mr. Swinhoe gives *Vesperugo abramus* (et *akokomuli*), Tem., and *V. imbricatus*, Tem., as distinct, P. Z. S. 1870, p. 618.

† J. A. S. B. xl. p. 461.

‡ P. Z. S. 1872, p. 710.

§ Monatsb. Berl. Akad. 1866.



the fur slightly tipped with earthy-brown on the upper-parts, and much more largely with a paler (almost whitish) brown below; membranes dusky. Length  $3\frac{1}{4}$  in., of which tail  $1\frac{1}{2}$  in.; expanse  $9\frac{3}{4}$  in.; fore-arm  $1\frac{1}{2}$  in.; ear-conch (posteriorly)  $\frac{1}{2}$  in. Three specimens (females).

[This species must ever remain doubtful, for the types referred to above cannot be found in the Indian Museum collection. They were absent from the collection of the Asiatic Society when it was transferred to the Indian Museum, Calcutta.—G.E.D.]

It need hardly be remarked that the foregoing is a meagre list of the *Chiroptera* which may reasonably be expected to inhabit the different provinces of British Burma; but it is a group which for various reasons is neglected by ordinary collectors, and one that to be investigated with tolerable success requires some special attention to be bestowed upon it. Only those zoologists who have made some study of the Bats can have an adequate idea of the multitudinous variety of them, not only as regards specific but very strongly marked divisional forms; and exceedingly little is as yet known of the diversities of habit which must needs accompany so much variation in structure.

#### Sub-order CARNIVORA.

##### Fam. Canidæ.

#### 41. CANIS RUTILANS (J. 137).

*Canis rutilans*, Müller; vide Murie, on "Indian Wild Dogs," P. Z. S. 1872, p. 715 et seq. *Tau-khwaë* (Mason).

The "Dhole" is generally diffused through the forests, but apparently not common anywhere; it hunts in packs.

A Burmese female in the People's Park, in Madras, "upwards of three years old," is stated by Col. McMaster to answer to Hodgson's description of the *Buánsu* of Nipâl, "except in her height, which cannot be more than seventeen or eighteen inches." In Malacca and Sumatra the race, *C. sumatrensis*, Hardwicke, is smaller and deeper coloured, and the Tenasserim race is probably identical with it, whether or not so with that of India. In the latter there is considerable difference in the appearance of the animal according to season, the winter vesture being longer and paler in colouring, with the brush much more finely developed. This seasonal difference may well have given rise to some of the notions regarding a plurality of species.



\*42. *C. AUREUS*.*Canis aureus*, Lin.; *Myae Khucac* (Mason).

The Jackal is not uncommon at Akyab, and it has been shot in the vicinity of Prome, and at Thyetmyo; but in Arakan it has not passed the boundary of the Naf river.

*Fam. Viverridæ.*

Sub-fam. VIVERRINÆ (Civets and Genets).

\*43. *VIVERRA ZIBETHA* (J. 119).*Viverra zibetha*, Lin., S.N.T. 65; *Kyoung-myen*, Arakan.

The Grey Civet is a widely diffused species, which, Mr. Swinhoe states, inhabit China from Hongkong to Shanghai, as also the Chusan Archipelago, and the island of Hainan. Dr. Cantor procured it in the Malayan peninsula, Province Wellesley; and it inhabits Arakan, and probably is extensively diffused over the Indo-Chinese countries, as in Lower and Eastern Bengal, and the Tarai at the foot of the Eastern Himalaya.

\*44. *V. MEGASPILA*.

*Viverra megaspila*, Blyth, J. A. S. B. xxxi. p. 331; *V. zibetha*, apud Waterhouse, Cat. Zool. Soc. Mus. 1838, No. 252; *V. tanggalunga*, apud Cantor, J. A. S. B. xv. p. 197. nec apud Gray. *Khyoung-myen*, Mason.

Large-spotted Civet. Of the same size as *V. zibetha*, with the body-markings large and black, and comparatively few in number, *i.e.* as compared with *V. civettina* of Malabar. I have seen flat skins of this animal from Prome, resembling those which Dr. Cantor procured in Province Wellesley, and one brought from Sumatra by Sir T. S. Raffles, which was formerly in the Museum of the Zoological Society in London. It is nearly allied to *V. civettina* of S. Malabar, but very different from *V. tanggalunga*, Gray, of the Malay countries, which is a much smaller animal, with more cat-like tail, and the spots of which are much smaller and more numerous. In the Philippine Islands it is probable that *V. tanggalunga* should be regarded as an introduced species.

\*45. *VIVERRICULA MALACCENSIS* (J. 121).

*Viverra malaccensis*, Gmelin, S.N. 92. *Wa-young-kyoung-bank*, Arakan. *Kyoung-ka-do*, Mason.

The Common Viverette. It is abundant in the Indo-Chinese countries, as in India, S. China, and the Malayan peninsula and islands. There is a nearly allied species in Madagascar.



## Sub-fam. PARADOXURINÆ (Musangs).

## \*46. PARADOXURUS GRAYI (J. 124).

*Paradoxurus grayi*, Bennet, P. Z. S. 1835, p. 118.

Hill Musang. Inhabits the Arakan hills.

## \*47. P. MUSANGA (J. 123).

*Paradoxurus musanga*, F. Cuv., Mamm. Lith. ii. t. 55. *Kyoung-weon-bank*, Arakan.

Common Musang. As common as in the neighbouring countries.

## 48. P. TRIVIRGATUS.

*Paradoxurus trivirgatus*, Temm. Monagr. ii. t. 63, fig. 1; *Kyoung-na-ga*, Mason.

The three-streaked Musang inhabits Tenasserim provinces, Malayan peninsula, Sumatra, and Java.

## \*49. P. LEUCOTIS.

*Paradoxurus leucotis*, Blyth, J. A. S. B. xxvii. p. 274; Horsfield's Catal. Mamm. India House Mus., No. 66. *Na-zwet-phyoo*, Arakan.

The white-eared Musang inhabits Sylhet, Arakan, and Mergui.\*

## \*50. ARCTICTIS BINTURONG (J. 126).

*Viverra binturong*, Raffles, Trans. Lin. Soc. xiii. p. 253. *Myouk-kye*, or "Monkey-tiger," Arakan.

The Binturong inhabits the Mishmi hills, at the head of the valley of Assam, and occurs southward to the Straits of Singapore, and is also found in the islands of Sumatra and Java. Finlayson procured it in Siam.

## Fam. Herpestidæ.

## Mongoose.

## \*51. URVA CANCRIVORA (J. 134).

*Urva cancrivora*, Hodgson, J. A. S. B. vol. vi. p. 561. *Mwai-ba*, Arakan.

The crab-eating Mongoose is found in Nipâl, the Khásia hills, Arakan, Pegu, N. Tenasserim, Vokien hills near Amoy (Swinhoe). It is the only representative of the Mongoose group in British Burma.

\* The species found in the Andaman Islands appears to be identical with *P. leucotis*, Blyth. It was, however, described as a new form by the late Lieut.-Col. Tytler, and named after himself as *P. tytleri* (J. A. S. B. 1864).





## Fam. Felidæ.

## Cats.

52. *FELIS TIGRIS* (J. 104).

*Felis tigris*, Lin.; *Tigris regulis*, Gray, P. Z. S. 1867, p. 263. *Kya*, Arakan.

The Tiger. Common in the forests.

53. *F. PARDUS* (J. 105).

*Felis pardus*, Lin.; *Leopardus pardus*, Gray, P. Z. S. 1867, p. 263. *Theet-kye*, Arakan.

The Pard. Also common; and black individuals not rare in the Southern Tenasserim provinces and Malayan peninsula.

\*54. *F. MACROCELIS* (J. 107).

*Felis macrocelis*, Temminck; *F. diardi*, F. Cuvier.

The clouded Tiger-cat. A skin has been obtained in the mountains which separate Arakan from Pegu, and the species is probably of general occurrence in the higher mountain forests. Crawford noticed a dressed skin of it in the market at Bangkok. As the animal increases in age, its ground-hue becomes more fulvescent, and there is much individual variation in its markings. I have never seen it from the Malayan peninsula, but it inhabits Sumatra and Borneo, as likewise the Eastern Himalayas, and the islands of Formosa and Hainan; doubtless, therefore, the intervening countries generally in suitable localities. Hodgson notes it from Tibet!

55. *F. VIVERRINA* (J. 108).

*Felis viverrina*, Bennet, P. Z. S. 1833, p. 68.

The fishing Tiger-cat. Tenasserim provinces, and probably the lowlands generally of British Burma; also Camboja, S. China, Formosa, and all suitable parts of India, with Ceylon. This animal has coarse fur, for a *Felis*, and chiefly inhabits low watery situations, where it preys much on fish.

\*56. *F. UNDATA* (J. 110).

*Felis undata*, Demarest. *Theet-kyoung*, Arakan.

The Leopard-cat. Generally diffused. Specimens from Arakan and Tenasserim present the ordinary colours of Indian examples, with the body-markings resembling those of *Genetta afra*. Dr. Gray describes *F. tenasserimensis*,\* but I cannot perceive that the flat skin upon which this is founded differs from ordinary *F. undata*.

\* P. Z. S. 1867, p. 400.



\*57. *F. CHAUS* (J. 115).

*Felis chaus*, Gildenst. *Khyoung tsek-koon*, Arakan.

The Chaus. The author procured this species in Arakan, and Col. McMaster states that he "shot a very fine one in Burma." Egyptian specimens exhibited in the London Zoological Gardens do not differ in any respect, that I can perceive, from the common Indian species.

Mason refers to a species about the size of a domestic cat, "but its colour and markings are exactly those of a Tiger. These Cats," he adds, "are very abundant in the jungles, and occasionally venture into towns, where they make great havoc among the poultry." I could not well fail to have met with such a species, did it exist, and take leave to doubt that any small species of Cat is coloured and marked exactly like a Tiger. *F. undata* is doubtless intended, at least in part.

Mason also refers to an animal which he denominates the "Fire-cat," or "Fire-tiger," of the Burmans. This is very probably *F. temminckii*, Vigors (*F. moormensis*, Hodgson, and *F. chrysothrix*, Tem. MS.), which is found not only in Nipâl and Assam, but in the Malayan peninsula and Sumatra, and therefore may be expected to occur in the intervening territory. It has been lately figured by Dr. Sclater.\*

## Fam. Mustelidæ.

## Sub-fam. LUTRINÆ (Otters).

\*58. *LUTRA NAIR* (J. 100).

*Lutra nair*, F. Cuv. *Phyau*, Arakan.

Common on both sides of the Bay of Bengal.

\*59. *AONYX LEPTONYX* (J. 102).

*Lutra leptonyx*, Horsfield, Zool. Res. Java.

Otter with minute claws. "Otters abound in some of the streams. In the upper part of the Tenasserim, a dozen at a time may be occasionally seen on the rocks of the river. The Burmese sometimes domesticate them, when they will follow a man like a dog" (Mason).† As common as the former species.

\* P. Z. S. 1867, pl. xxxvi. p. 816.

† No animals are more difficult to determine than the species of Otter, from their general similarity, which may lead to over-hasty identification of them, and the neglect to note specific differences which appear on minute examination. The skulls generally afford good means of discrimination.





Sub-fam. MUSTELINÆ (Martens, Weasels,\* and Badgers).

\*60. *MARTES FLAVIGULA* (J. 96).

*Mustela flavigula*, Boddaert.

Black-capped Marten. Khásia hills and Arakan.

Similar to Himalayan specimens, and differing from the Malayan race, found also in Formosa, by having much longer fur and a wholly black cap, instead of a brown cap with black periphery.

\*61. *HELICTIS NIPALENSIS* (J. 95).

*Gulo nipalensis*, Hodgson, J. A. S. vol. v. p. 237; *Melogale personata*, Is. Geoffroy. *Kyoung-pyan* (Mason).

The Brock-weasel. Arakan, and common in Pegu.

It is decidedly identical with the species inhabiting Nipál and Sylhet, if not also with *H. orientalis* (Horsf.) of Java; but distinct from *H. moschata*, Gray, of S. China and Hainan, and *H. subaurantiaca*, Swinhoe, of Formosa. Dr. Gray identifies *Melogale personata*, from the vicinity of Rangoon, with the Chinese *H. moschata*, judging—it may be presumed—from the figure rather than the description in the *Zoologie* of M. Bélanger's *Voyage aux Indes Orientales*.†

\*62. *ARCTONYX COLLARIS* (J. 93).

*Arctonyx collaris*, F. Cuv., Mamm. Lith. iii. t. 60; *Arctonyx isonyx*, Hodgson. *Khway-too-wet-too*, Arakan; *Khwaee-tawet, wet-tawet* (Mason).

Large Burman Sand-badger.‡ Inhabits Assam, Sylhet, and Arakan, and at least as far southward as the country bordering on the Sitang. An Arakan specimen is figured.§

63. *A. TAXOIDES*.

*Arctonyx taxoides*, Blyth, J. A. S. B. xxii. p. 591.

The small Burman Sand-badger is much smaller and better clad than the preceding, with the pig-like snout less developed. Both appear to have much the same geographic range.

\* The *Mustela nudipes*, F. Cuv., inhabits the mountains of the Malayan peninsula, Sumatra, and Java, and may therefore be looked for on those of the Tenasserim provinces.

† P. Z. S. 1865, p. 153.

‡ [In Jerdon's Mammals of India, the Hindustani Bhalu-soor, *i.e.* Bear-pig, is given as the native name of this animal; but this seems to be an error, for the usual term applied to it is Bâli-soor, which means Sand-pig, which is in consonance with its known habits.—J.A.]

§ J. A. S. B. vol. vii. p. 735, pl.





Nearly allied is the *Mydaus meliceps*, Horsfield, of the higher mountains of the Malayan peninsula, Sumatra, and Java, which is likely also to inhabit those of the Tenasserim provinces. *M. leptorhynchus*,\* A. M.-Edwards, is described from N. China.

Fam. Ursidæ.

Bears.

\*64. *HELARCTOS MALAYANUS* (J. 43).

*Ursus malayanus*, Raffles, F. Cuv. Mamm. Lithog. iii. t. 58. *Wet-woon*, Arakan.

The Sun Bear. This is the only Bear which inhabits British Burma, where it is diffused from Arakan to Mergui, and thence southward throughout the Malayan peninsula, Sumatra, and Borneo; the Bornean race, *U. eurygilus*, Horsfield,† differing but slightly. How far northward of Arakan its range of distribution may extend, I am unaware; but *Ursus tibetanus*, the common Black Bear of the forest region of the Himalaya, is the only Bear as yet determined from the hill ranges bordering on Assam, and this I believe to be the *U. malayanus* apud Walker;‡ the same animal occurring likewise in S. China, and in the islands of Hainan (?) and Formosa.§ In all probability the *H. malayanus* is generally diffused over the great Indo-Chinese peninsula, where it especially inhabits the precipitous limestone mountains, and is therefore difficult of access, from the tangled vegetation of the places to which it resorts. When brought up tame, it is an animal of gentle disposition, which will follow people about like a dog. I have seen one that suffered itself to be fondled by little children. "On one occasion," writes Mason, while "sleeping in a Karén field that had been recently harvested, I was disturbed all night by a number of them digging up the roots of the sugar-cane that had been left in the field. They will occasionally attack man when alone. On descending the Tenasserim a few years ago on rafts, the foremost raft passed over a rapid, and made short a turn into a little cove below, when a Bear from the shore made a plunge at the raft, and threw the two Karéns on it into the water. At this moment the other boats came in sight, and the Bear retreated. On another occasion I met with a Burman and a Bear that he had just shot, and the Burman assured me that he had shot the Bear in the very act of running upon him. And last year," continues Mason, "a Karén of my acquaintance in Tonghoo was attacked by one, overcome, and left by the Bear for dead.

\* Ann. Sci. Nat. ser. v. tom. viii. p. 374, and Ann. M. N. H. (4), t. ii. p. 230.

† Zool. Journ. vol. i. pl. 7.

‡ Calc. Journ. N. H. iii. p. 265.

§ P. Z. S. 1870, pp. 230, 621.



Though severely bitten, the man recovered." It is probable that such acts are prompted by maternal solicitude. The common Sloth Bear, or *Prochilus labiatus*, of India and Ceylon, is unknown to the eastern side of the Bay of Bengal.

Of the Infra-sub-order PINNIGRADA, or Seals, etc., there is no representative in inter-tropical seas.

#### Sub-order INSECTIVORA.

##### Fam. Tupaidæ.

##### Tupayes.

##### \*65. TUPAIA PEGUANA (J. 88).

*Tupaia peguana*, Lesson, Bélanger's Voy., Atlas, t. 4; *Cladobates belangeri*, Wagner; *Herpestes* sp., Calc. Journ. N. H. ii. p. 458. *Tsoui*, Arakan.

Common throughout British Burma, but hardly separable from *T. ferruginea*, Raffles, of the Malay countries, from which it seems to differ only in wanting the deep ferruginous tinge on the upper-parts, though even this is not quite absent in some specimens. Northward it extends to the Khásias, and even to the lower range of the Sikhim Himalaya.

According to Col. McMaster, "Burmese specimens differ somewhat from those of Arakan, in having the lower parts much darker, and with the pale central line narrower; in the Burmese examples, the whole chin, throat, and breast being buff." He also remarks that "the Burmese Tupaia is a harmless little animal: in the dry season living on trees, and in the Monsoon freely entering our houses, and in impudent familiarity taking the place held in India by the common Palm Squirrel; it is, however, probably from its rat-like head and thievish expression, very unpopular. I cannot," he adds, "endorse Jerdon's statement regarding their 'extraordinary agility,' for they did not to me appear to be nearly so active as Squirrels: at least, I remember one of my terriers on two occasions catching one, a feat which I have never seen any dog do with a Squirrel; cats of course often pounce upon them." Mason remarks that "one that made his home in a mango-tree near my house at Tonghoo made himself nearly as familiar as the cat. Sometimes I had to drive him off the bed, and he was very fond of putting his nose into the tea-cups immediately after breakfast, and acquired quite a taste both for tea and coffee. He lost his life at last, by incontinently walking into a rat-trap."

In the vicinity of Malacca the small *T. javanica*, Horsf.,\* is associated

\* Zool. Res. in Java.



with *T. ferruginea*, though unnoticed in Dr. Cantor's "Catalogue of the Mammalia of the Malayan Peninsula;" and perhaps the most extraordinary instance in the class of what has been termed "mimicry" occurs in a Squirrel, *Rhinosciurus tupaiades*, Gray, differing little, if at all from *Sciurus laticaudatus*, S. Müller, of Sumatra and Borneo, which inhabits the same district. Not only does this rodent resemble *T. ferruginea* in size and the texture and colouring of its fur, but the muzzle is singularly elongated, and there is even the pale shoulder-streak usual in the genus *TUPAIA*. As a group of *Insectivora* the Tupayes would seem to "mock" the Squirrels; but the particular species of Squirrel referred to again specially simulates the *Tupaia ferruginea* of the same locality.

Another Malayan species of the order *Insectivora*, the *Gymnura rafflesii*, Vigors and Horsfield (*Viverra gymnura*, Raffles), occurs probably in Mergui, and is doubtfully mentioned as having been received from Arakan,\* probably by mistake. This remarkable animal is not unlikely to be the "Opossum" of Colonel Low,† for it is difficult to imagine what other animal could be alluded to by that name.

#### Fam. Erinaceidæ.

##### 66. *HYLOMYS SUILLUS*.

*H. peguensis*, Blyth, J. A. S. B. xxviii. p. 294; Anderson, Trans. Z. S., vol. viii. p. 453.

Procured by Major Berdmore in the valley of the Sitang river. The Bornean specimens which I saw at Leyden appeared, without actual comparison, to be quite identical.

#### Fam. Soricidæ.

##### Sub-fam. SORICINÆ (Shrews).

##### 67. *PACHYURA INDICA* (J. 69).

*Sorex indicus*, Geoff.; *S. corulescens*, Shaw; *Pachyura indica*, Anderson, P. Z. S. 1873, p. 231. *Kywet-suk* (Mason).

Indian Musk Shrew. The common pale grey Musk Shrew, vulgarly called the "Musk Rat" in India, occurs in the Tenasserim provinces, where, if I mistake not, it is the prevalent species.

\* Calc. Journ. N. H. ii. p. 147.

† J. R. A. S. iii. p. 60, and As. Res. xvii. p. 159.



68. *P. MURINA* (J. 70).

*Sorex murinus*, Lin.; *Pachyura murina*, L. Anderson, P. Z. S. 1873, p. 231.

Malayan Musk Shrew. "This," remarks Dr. Jerdon, "is the common large 'Musk Rat' of China, Burma, and the Malayan peninsula, extending into Lower Bengal and Southern India, especially the Malabar coast, where it is said to be the common species, the bite of which is considered venomous by the natives. The musky odour of this Shrew is much less powerful than in *S. caeruleus*." I was never able to obtain a specimen of it in Lower Bengal, and am not wholly satisfied with regard to its alleged range in Burma.

69. *P. GRIFFITHII*.

*Sorex griffithii*, Horsfield, Catal.; Tames, Ann. M. N. H., 2nd ser. vol. xxiv. p. 28; *P. griffithii*, Horsfd., Anderson, P. Z. S. 1873, p. 231.

The large Black Shrew. Inhabits the Khásia hills and those of Arakan; certainly not Afghánistán, as stated by Dr. Horsfield.\*

70. *P. NUDIPES*.

*Sorex nudipes*, Blyth, J. A. S. B. xxiv. p. 34; *S. perroteti* apud Blyth, *ibid.* xvi. p. 1275. *P. nudipes*, Blyth, Anderson, P. Z. S. 1873, p. 231.

The Bare-footed Shrew. One of the group of minute Shrews, which appears to be of common occurrence in the Tenasserim provinces.

71. *CROCIDURA FULIGINOSA*.

*Sorex fuliginosus*, Blyth, J. A. S. B. vol. xxiv. p. 362; *Crocidura fuliginosa*, Anderson, P. Z. S. 1873, p. 231.

The Dusky Shrew. Procured by Major Berdmore in the Tenasserim Provinces.

## Sub-fam. TALPINÆ (Moles).

72. *TALPA LEUCURA*.

*Talpa leucura*, Blyth, J. A. S. B. vol. xix. p. 215, and figure of skull.

The Sylhet Mole. Obtained by Major Berdmore in the valley of the Sitang.

\* The late Mr. S. Griffith collected both in the Khásia hills and in Afghánistán, and his specimens from those two very distinct localities became intermixed and confounded. Hence several Khásia species of mammalia, birds, and reptiles have been erroneously stated by Messrs. Horsfield and Moore to inhabit Afghánistán. *Vide Ibis*, 1872, p. 89.





## Order CETACEA.

## Fam. Delphinidæ.

Dolphins and Porpoises.

## 73. ORCELLA FLUMINALIS.

*Orcella fluminalis*, Anderson, P. Z. S. 1870, pp. 220, 544; 1871, pl. 43, fig. 2.  
*La-boing* (Mason).

The Irawádi Dolphin, inhabiting the deep channels of the river from 300 to 600 miles from the sea. Colour uniform dirty white.

## Fam. Balænopteridæ.

Rorquals.

## 74. BALÆNOPTERA INDICA (J. 147).

*Balænoptera indica*, Blyth, J. A. S. B. vol. xxviii. p. 488.

Indian Rorqual. A specimen eighty-four feet in length was cast upon Juggoo or Amherst Islet, South of Ramri, and East of Cheduba, on the Arakan coast, in 1851: another was stranded on the Chittagong coast in 1842, said to have been ninety feet long and forty-two feet in circumference.\* Whale Bay, in the Mergui archipelago, was so named by Captain R. Lloyd, "from the circumstance of its being resorted to by numerous Whales,"† it being the only part of the coast where he had seen them.

## Order PROBOSCIDEA.

## Fam. Elephantidæ.

## 75. ELEPHAS INDICUS (J. 211).

*Elephas indicus*, Linn.; *Hsœu*, Mason; *Chang*, Siamese.

The Asiatic Elephant. The Elephant of Sumatra, and also that of Ceylon is considered by Professor H. Schlegel to be a peculiar species, *E. sumatranus*, Schlegel; but the late Dr. Falconer did not admit of the alleged distinctions, and a large living male Sumatran Elephant in the Zoological Gardens of Amsterdam, as also a half-grown one in that of Rotterdam, are certainly not to be distinguished by any external character from the ordinary Indian Elephant.

\* Noted in J. A. S. B. xxi. p. 414, and xxviii. p. 482.

† *ibid.* vii. p. 1030, and map.





## Order RODENTIA.

## Fam. Sciuridæ.

## Sub-fam. PTEROMYDINÆ (Flying-squirrels).

## \*76. PTEROMYS CINERACEUS.

*Pteromys cineraceus*, Blyth, J. A. S. B. xxviii. p. 276; *P. petaurista*, var. *cineraceus*, Bl., *ibid.* xvi. p. 864. *Shau-byau*, Arakan.

The Burmese Great Flying-squirrel inhabits Arakan, Pegu, Tenasserim provinces. It is a large species, very like *P. petaurista* of Central and Southern India and also Ceylon, but generally with whitish tail; one Tenasserim specimen, however, is unusually rufous, with the tail coloured uniformly with the upper-parts.

Many specimens of this animal require to be collected and compared together.

## \*77. SCIUROPTERUS PHAYREI.

*Sciuropterus phayrei*, Blyth, J. A. S. B. xxviii. p. 278; *S. sagitta*, apud Blyth, *ibid.* xxiv. p. 187.

Pegu, Tenasserim Provinces, and Cambodja, where it was obtained by Mouhot. It is akin to *S. horsfieldi*, Waterhouse (*S. aurantiacus*, Wagler), of the Malayan peninsula.

## \*78. S. SPADICEUS.

*Sciuropterus spadiceus*, Blyth, J. A. S. B. xvi. p. 867, pl. xxxvi. fig. 1. *Kywat-shoo-byau*, Arakan.

It inhabits Arakan, and is a diminutive species, of the same size as *S. volucella* of North America.

## Sub-fam. SCIURINÆ (Squirrels).

## \*79. SCIURUS MACRUROIDES (J. 151).

*Sciurus macruroides*, Hodgson. *Leng-thet*, Arakan; *Sheu* (generic), Tenasserim, Mason.

The large Black Squirrel. This is the Himalayan *S. bicolor*, auct., with densely clad ear-conch, whereas Malayan specimens referred to the same have an almost nude ear-conch. There is a Tenasserim local race, with broad pale transverse band on the loins, forming a kind of cincture. The true *S. bicolor*, Sparrman, is now identified with the Javanese race, *S. hypoleucus*, Horsfield, which is not larger than the *S. macrourus* com-



mon in Ceylon. Examples from the Arakan mountains do not differ from those of the E. Himalaya and the hills bordering on the Bráhmáputra valley to the southward of it. The races brought together under the name *S. giganteus*, Tem., seem to be almost endless, but each of them is locally true to its particular type of colouring, within a moderate range of variation.

\*80. *S. FERRUGINEUS*.

*Sciurus ferrugineus*, F. Cuv., Mamm. Lithog.; *S. keraudreni*, Is. Geoffroy, vide J. A. S. B. xxiv. p. 474, xxxi. p. 334; *S. siamensis*? Gray.

The Bay Squirrel. Occurs in the hilly regions of Arakan and Pegu.

81. *S. CANICEPS*.

*Sciurus caniceps*, Gray, Ann. M. N. H. 1842, p. 212; *S. chrysonotus*, Blyth, J. A. S. B. xvi. p. 873, xxiv. p. 474.

The Golden-backed Squirrel. It inhabits the Tenasserim provinces, but is commoner to the southward; it is certainly not found in Bhotan, or any part of India, as asserted by Dr. Gray.

82. *S. ATRODORSALIS*.

*Sciurus atrodorsalis*, Gray, Ann. M. N. H. 1842, p. 213; vide J. A. S. B. xxiv. p. 477, xxviii. p. 276; var. *S. hyperythrus*, Blyth, J. A. S. B. xxiv. p. 474, vide Beavan in P. Z. S. 1866, p. 428; *S. rufogaster*, Gray, same variety.

The Black-backed Squirrel. It is common in the hills about Maulmein, but is replaced on the opposite side of the Salween by the next species. It certainly does not occur in "India, Benáres," as asserted by Dr. Gray.

\*83. *S. PHAYREI*.

*Sciurus phayrei*, Blyth, J. A. S. B. xxiv. p. 476, xxviii. p. 275; *S. pygerythrus*, var.? *ibid.* xvii. p. 345.

Phayre's Squirrel. It is common throughout the Province of Martaban, but does not inhabit Malabar, as has been stated.\*

84. *S. BLANFORDI*.

*Sciurus phayrei*, Blyth, J. A. S. B. xxxi. p. 333.

It has been found in the vicinity of Ava, and the Shán hills, but not in "India," as asserted by Dr. Gray.

\* Ann. M. N. H. ser. 3, vol. xx. p. 277.



85. *S. PICEUS*.

*Sciurus piceus*, Peters, Proc. Zool. Soc. 1866, p. 429.

Tenasserim.

\*86. *S. LOKRIAH* (J. 153).

*Sciurus lokriah*, Hodgson, J. A. S. B. 1836, p. 233 ; *S. subflaviventer*, M'Clelland, vide J. A. S. B. xxiv. p. 475.

A mountain race, inhabiting Nipâl, Sikhim, the Khásia hills, and those of Arakan.

\*87. *S. ASSAMENSIS*.

*Sciurus assamensis*, M'Clelland, vide J. A. S. B. xxiv. p. 475 ; *S. blythii*, Tytler, Ann. M. N. H. 1854, p. 72.

A very abundant race, inhabiting the valley of the Bráhmáputra, with Eastern Bengal, Tippera, Chittagong, and Arakan.

\*88. *S. PYGERYTHRUS*.

*Sciurus pygerythrus*, Is. Geoff., Zoologie Voy. de Belanger, vide J. A. S. B. xxiv. p. 475.

It inhabits Lower Pegu, and is common in the neighbourhood of Rangoon.

89. *S. SLADENI*.

*Sciurus sladeni*, Anderson, P. Z. S. 1871, p. 139.

Thizyain, in Upper Burma.

90. *S. GORDONI*.

*Sciurus gordonii*, Anderson, P. Z. S. 1871, p. 140.

Bhamo, Upper Burmah.

91. *S. QUINQUESTRIATUS*.

*Sciurus quinquestriatus*, Anderson, P. Z. S. 1871, p. 142.

A hill species, common at Ponsee, on the Kakhyen range of hills, east of Bhamo, at an elevation of from 2000 to 3000 feet.

92. *S. BERDMOREI*.

*Sciurus berdmorei*, Blyth, J. A. S. B. xviii. p. 603, xxviii. p. 418, xxxi. p. 334 ; *S. mouhoti*, Gray.

The Ground Squirrel. Tenasserim, Martaban, Mergui, Cambodja.

From what I have observed of this species I doubt if it ever ascends trees, as I never saw it retreat to them, but always to the cover of low herbage. It should, perhaps, more properly range as a species of *Tamias*.



93. *S. BARBEI*.

*Sciurus barbei*, Blyth, J. A. S. B. xvi. p. 875, pl. xxxvi. fig. 3, xviii. p. 603.

Tenasserim provinces, commoner to the southward, Siam, Cambodja? Hainan? S. China?

A Malacca specimen in the Leyden Museum is marked *Tamias leucotis*, Tem. It is closely allied to *S. m'clellandii* of the E. Himalaya and also of Formosa, but more brightly coloured, having four pale dorsal stripes about equally vivid, alternating with five black stripes. It is doubtless *S. m'clellandii* of Cambodja,\* of Hainan,† and of China and Formosa;‡ but a Formosan specimen in the Leyden Museum represents the Himalayan race, *S. m'clellandii*. Mason remarks of *S. barbei* that it abounds in the provinces of Yé, Tavai, and Mergui.§

## Fam. Muridæ.

## Rats and Mice.

94. *HAPALOMYS LONGICAUDATUS*.

*Hapalomys longicaudatus*, Blyth, J. A. S. B. xxviii. p. 296.

A remarkable murine form, from Schwe Gyen in the valley of the Sitang or neighbouring hills, discovered by Major Berdmore.

95. *NESOKIA INDICA* (J. 172).

*Nesokia indica*, Gray; *Mus indicus*, Geoff. Probably *Yae-kwet* of Mason.

It has been obtained at Tonghoo by Mr. W. Theobald.|| The occurrence of this common Indian field Rat in the open country of upper Pegu, together with a Hare akin to the *Lepus ruficaudatus* of the plains of Northern India, and of sundry birds identical with or akin to Indian species which are unknown in the broad belt of forest which fringes the coast of British Burma, indicates the probability of a closer connexion subsisting between the faunæ of the upper provinces of the two peninsulas than we as yet know of; our acquaintance with the fauna of Western Indo-China being chiefly confined to that of the great maritime belt of forest. The present species is, however, indicated by Mr. Swinhoe from Formosa.

\* P. Z. S. 1861, p. 137.

† *ibid.* 1870, p. 232.

‡ *ibid.* 1870, p. 634.

§ In addition to all of the above, I have seen an undescribed species of medium size from Tonghoo.

|| P. A. S. B. 1866, p. 240.



96. *MUS BANDICOTA* (J. 174).*Mus bandicota*, Bechstein. *Myas-kywet* (Mason).

This species I give on the authority of Mason, which I accept the more readily as it is known to occur in Siam and the Malayan peninsula and islands; also in Formosa, where Mr. Swinhoe thinks that it was probably introduced when the Dutch were in possession, A.D. 1630.\*

\*97. *M. DECUMANUS* (J. 176).*Mus decumanus*, Pallas, Glires, 91.

The common Brown Rat. I observed this pest to be very numerous and troublesome at Akyab, but saw no traces of it at Rangoon or Maulmein, nor further southward; but wherever there is European shipping, it will sooner or later find its way and establish itself permanently.

\*98. *M. ROBUSTULUS*.

*Mus robustulus*, Blyth, J. A. S. B. xxviii. p. 294; Theobald, P. A. S. B. 1866, p. 240; *M. berdmorei*? Blyth, J. A. S. B. xx. p. 173; *M. rufescens*, Gray, var. ?

Common Rat of Rangoon and Maulmein, also of Mergui. Requires to be critically examined in the fresh state.

Under the heading of "White-bellied Rat," Mason remarks that "the Rats are scarcely second to the Termites for the mischief they perpetrate. They burrow in the gardens and destroy the sweet potatoes; they make their nests in the roofs by day and visit our houses and larders by night. They will eat into teak drawers, boxes, and book-cases, and can go up and down anything but glass. In the province of Tonghoo they sometimes appear in immense numbers before harvest and devour the paddy like locusts. In both 1857 and 1858 the Karens on the mountains west of the city lost all their crops from this pest; and it is said that they are equally destructive occasionally in the eastern districts, but have not appeared for several years. The natives say it is the same Rat as the one that frequents houses."

Again, he remarks that Mr. Cross, when on the Tenasserim river a few months ago (in 1858?), wrote—"The people, in common with all who grow the hill paddy, over an extent of country more than fifty miles square, are suffering a famine of rice. This is occasioned by swarms of Rats, which devoured the paddy, or rather cut down the stalks, just as the ears began to fill. The Rats twice visited some parts of this territory during the season,

\* P. Z. S. 1870, p. 635.



so that scarcely a stalk of rice escaped them. I met with two of these animals, swimming the Tenasserim where it is more than a quarter of a mile wide, and succeeded in capturing one. The animal is about five inches from the nose to the end" (base?) "of the tail, of a slim and nimble appearance, the belly white, and the rest a mouse colour. During the rains, when the river is much wider and more rapid, these Rats crossed in columns, as the people say, so abundantly that a boat, in passing through, caught bushels of them. They only make their appearance at long intervals, like the locusts of other places. It is said to be from twenty to thirty years since they visited the country before, to any great extent."

99. *M. CAUDATIOR* (J. 183).

*Mus caudatior*, Hodgson, Horsf. Cat. Mamm. India House Mus., p. 144; var. *M. cinnamomeus*, Blyth, J. A. S. B. xxviii. p. 294.

Lower Pegu and Martaban.

It differs only from the Nipâlese animal of Mr. Hodgson by having the upper-parts entirely of a bright cinnamon colour.

\*100. *M. CONCOLOR*.

*Mus concolor*, Blyth, J. A. S. B. xxviii. p. 295, the young; *ibid.* *M.* —? p. 294, the adult.

Upper and Lower Burma; Malayan peninsula.

It requires to be critically examined in the fresh state.

101. *M. PEGUENSIS*.

*Mus peguensis*, Blyth, J. A. S. B. xxviii. p. 295.

Schwe Gyen, valley of the Sitang river.

A particularly well-distinguished species, of which there is an unmistakeable specimen marked from the Philippines in the Derby Museum of Liverpool. Mason suspects this to be the field Mouse of the Karen districts.

102. *M. NITIDULUS*.

*Mus nitidulus*, Blyth, J. A. S. B. xxviii. p. 294.

Valley of the Sitang. Mason notices a "very familiar little Mouse in the houses at Tounghoo," which he never saw in the Tenasserim provinces; and he inclines to refer it to the present species.

103. *M. BEAVANI*.

*Mus beavani*, Peters, P. Z. S. 1866, p. 559.

Valley of the Salween.



104. *M. badius*.*Mus badius*, Blyth, J. A. S. B. xxviii. p. 295.

Valley of the Sitang.

It is allied to *M. oleraceus* of India, the type of Dr. Gray's genus *Vandeleuria*.

Other species of Rat and Mouse doubtless remain to be discovered, and it is desirable that they should be minutely described when fresh. Of the former, a very likely species to occur is the *M. andamanensis*, Blyth,\* a subspinous Rat which proves to be the *M. setifer* apud Cantor,† but not *M. setifer* of Horsfield, which is identical with *M. bandicota*. Three well-distinguished species of Mice from the Khásia hills are described as *M. cunicularis*, *M. erythrotis*, and *M. gliroides*, Blyth.‡ According to Mason, "there is a Water Rat throughout the country which burrows in the banks of streams, and takes to the water when pursued."

105. *RHIZOMYS SUMATRENSIS*.

*Mus sumatrensis*, Raffles; *R. cinereus*, McClelland, Calc. Journ. N. H. ii. p. 456, and pl. xiv. not good; *Spalax javanus* et *Nyctocleptes dekan*, Temminck. *Picai*, Tenasserim, Mason.

Tenasserim provinces; Malayan peninsula and islands. Arakan? §

\*106. *R. castaneus*.

*Rhizomys castaneus*, Blyth, J. A. S. B. xii. p. 1007, xxxvi. p. 198; *M. badius* apud Blyth.

Arakan, Pegu.

Barely separable from *M. badius* (J. 201), from which it seems to differ only in its much brighter colouring.

107. *R. pruinus*.*Rhizomys pruinus*, Blyth, J. A. S. B. xx. p. 509.

Originally described from the Khásias, and obtained by Dr. Anderson in the vicinity of Bhamo. ||

108. *R. minor* (J. 201).*Rhizomys minor*, Gray, Ann. M. N. H. x. p. 226; Horsfield's Catal. No. 228.

Allied to the two preceding species, but of a dusky brown colour, with white muzzle and around the eye, and pale naked feet. I obtained a living

\* J. A. S. B. xxix. p. 103.

† *ibid.* xv. p. 254.‡ *ibid.* xxiv. p. 721.

§ Calc. Journ. N. H. ii. p. 297.

|| Journ. of Exped. p. 256.



specimen of this animal when in Upper Martaban, but the skin of it got spoiled; and I at once recognized the same species in two drawings of it as obtained in Siam by Capt. Finlayson. It has likewise been obtained at Yanangeen, on the Irawadi. It is even included, together with *R. sinensis*, Gray, in Mr. H. Walker's "Catalogue of the Mammalia of Assam" (*ibid.* iii. p. 267); but both species are there in need of verification. Mason remarks that "this animal, which burrows under old bamboo roots, resembles," to some extent, "a Marmot more than a Rat, yet it has much of the Rat in its habits. I one night caught a specimen gnawing a coco-nut, while camping out in the jungles." According to Mason the Byhais call the Bamboo Rat *Khai*, and they say that there is the Bamboo Khai, the Reed Khai, the Maranta Khai, and the *Wie*, a very small species of the same tribe." In *R. sumatrensis* the fur is thin and bristly. The other three here given are smaller animals, with shorter tail and the fur soft and dense.

Fam. Hystricidæ.

Porcupines.

\*109. *HYSTRIX BENGALENSIS*? (J. 205).

*Hystrix bengalensis*, Blyth; *H. malabarica*, Selater, P. Z. S. 1865, p. 353, pl. xvi. *Phyoo*, Tenasserim (Mason).

The Porcupine of Arakan appears to be the same as that of Assam and of Eastern and Lower Bengal, the skull of which is not tumid, as in *H. leucura*, Sykes. Moreover, I cannot perceive (to judge from the stuffed specimen in the British Museum), that the adult *H. malabarica*, Day, differs from it in any respect. I have only seen small Arakan specimens, however, and will not be too confident that I am right in referring them to the present species.

110. *H. LONGICAUDA*? (J. 206).

*Hystrix longicauda*, Marsden; *Acantheon javanicum*, F. Cuv., Mém. Mus. ix. t. 1, fig. 3, 4.

I also give this Malayan species with hesitation, though I believe it to be that which inhabits the Tenasserim provinces.

There is also *H. alopæus*, Hodgson,\* from Nipâl, which seems to be one and the same with *H. grotei*, Gray,† from Malacca, remarkable for having but one black ring on its white quills. The skins of Porcupines when dried, and afterwards relaxed and set up in museums, are usually in wretched

\* J. A. S. B. 1847, p. 772, t. 32.

† [P. Z. S. 1866, p. 306, pl. xxxi. This species is referred by Mr. Selater to *H. longicauda*, Marsden, P. Z. S. 1871, p. 234.—Ed.]





condition, and when of young or half-grown specimens only, some of the supposed species of them (if they really be species) are difficult of discrimination. These animals require to be compared together when alive, adult, and in good condition, in order to be properly understood.

111. *ATHERURA FASCICULATA*.

*Hystrix fasciculata*, Shaw; Buffon, Supp. tom. vii. p. 303, t. 77.

This animal inhabits the Tippera hills, Siam, and the Malayan peninsula, and therefore probably the Indo-Chinese countries generally.

A living Malayan example in the London Zoological Gardens could not be distinguished from its African companions referred to *A. africana*, Gray; but an example from Assam is much paler in colour and more freckled, as was one which I possessed from Tippera. This northern race is well figured in Hardwicke's "Illustrations of Indian Zoology," copied from one of Buchanan Hamilton's drawings.

*Fam. Leporidæ.*

Hares.

112. *LEPUS PEGUENSIS*.

*Lepus peguensis*, Blyth, Journ. As. Soc. B. xxiv. p. 471. *Yung* (Mason).

Inhabits the open country within or beyond the range of forests. Crawford long ago remarked that "the Hare is unknown in Pegu, but that it makes its appearance in the hills before the disembogement of the Irawádi."

Order UNGULATA.

*Fam. Suidæ.*

113. *SUS CRISTATUS* (J. 215).

*Sus cristatus*, Wagner, Münch. gel. Anzeig. ix. p. 535, 1839; *S. indicus*, Gray. *Tau-wet* (Mason).

A boar which I examined at Akyab was of the ordinary Bengal race; but the Tenasserim wild boars are considerably smaller, the skulls of adults being one-fifth less in linear dimensions, though otherwise similar. One such was given to me in Calcutta as that of a tusked sow, and I afterwards found that the Tenasserim boar-skulls differed in no respect. The race requires to be critically examined. Mason remarks that the Tenasserim wild Hogs are of "a small blackish species, exceedingly numerous," and that they are very destructive to the Karen paddy-fields. According to Colonel McMaster, although some heads of Tenasserim wild boars, which I showed



him in Calcutta, "were certainly smaller than those of India," the animals which he had seen in Upper Pegu appeared to him to be about the same size as those which he had seen in former hunting days in India. That Pigs are inimical to snakes is well known; but Mason mentions that he has seen the head of a Python "that was killed by a drove of hogs, whose whole length measured eighteen feet." Whether wild or tame does not matter, but that author repeatedly uses the word "drove" in connexion with wild animals, even rats. It is a remarkable fact (if quite trustworthy) that a number of Hogs should thus combine to destroy a large Python.

*Fam. Tragulidæ.*

*Chevrotains.*

114. *TRAGULUS KANCHIL.*

*Moschus kanchil*, Raffles. *Yung*\* (Mason).

This small Chevrotain, or "Mouse-Deer," with a medial black stripe on the chest, is common in the southern Tenasserim provinces, and extends throughout the Malayan peninsula, Sumatra, and Borneo; but in Java it appears to be replaced by the equally diminutive *T. javanicus* (*T. pelandoc*, Blyth).† In Cambodja and Cochin-China there is a race which chiefly differs from *T. kanchil* in wanting the medial dark stripe on the chest (*T. affinis*, Gray);‡ and the island of Hainan, it is remarked by Mr. Swinhoe, "produces a Mouse Deer, which I have made out to be *Tragulus meminna*.§ The latter can hardly be, for that species (*Meminna indica*) is elsewhere unknown eastward of the Bay of Bengal. There is, again, a Chevrotain much larger than the *T. kanchil*, which seems to be generally diffused over the Malay countries, the *T. napu*, F. Cuvier, which is not unlikely to occur in South Tenasserim; and what are probably local races of *T. napu* have been described as *T. stanleyanus* and *T. fuscatus*, the pyrrhous *T. stanleyanus* having been erroneously supposed to inhabit Ceylon. *Meminna indica* is the only species of Chevrotain that inhabits Ceylon and the Indian peninsula; and throughout the Malay countries there are the larger *T. napu* and its subordinate races, and—except in Java—the smaller *T. kanchil* (to which *T. affinis* should perhaps be subordinated), with *T. javanicus* in Java only. The *T. kanchil* is the only one, so far as hitherto ascertained, that ranges northward into British Burma, and in the Malayan peninsula it is much more abundant than the *T. napu*.

\* The same name which he assigns to *Lepus peguensis*.

† J. A. S. B. xxvii. p. 277.

‡ P. Z. S. 1861, p. 138.

§ *ibid.* 1870, p. 644.





## Fam. Cervidæ.

## Deer.

## \*115. RUSA ARISTOTELIS (J. 220).

*Cervus aristotelis*, Cuv. Schap.

Common and generally diffused through the great forests. The Sâmur Deer of Burma appeared to me to be rather small, and I have never seen a fine pair of horns of this species from the countries eastward of the Bay of Bengal.

## \*116. HYELAPHUS PORCINUS (J. 222).

*Cervus porcinus*, Zimm.

The *Drai*, or Hog Deer, is very abundant. Mason observes, however, that this species seems to be confined to the plains. "It abounds," he states, "north and east of Maulmein, and on the large islands south of Tavai; but it is not found north of the station, nor eastward among the hills, nor in the valley of the Tenasserim, but is found again on the plains of the Sitang." Some individuals (especially does) are more or less distinctly "menilled" or spotted when in their summer coat, which has given rise to reports of the Indian Spotted Deer (*Axis maculatus*) having been observed in Burma. The so-called Hog Deer of Malabar is the *Meminna indica*; but, whether or not introduced (as is most probable), the true Hog-Deer inhabits a part of the west and south-west of Ceylon. The Indian Spotted Deer has been introduced into Province Wellesley and has there multiplied, as noticed by Cantor; and according to Raffles also in Sumatra, and there by native agency.

## \*117. PANOLIA ELDI.

*Cervus eldi*, Guthrie, Calc. Journ. N. H. ii. p. 416; horns figured, *ibid.* i. pl. xii, ii. pl. xii; *C. (Rusa) frontalis*, M'Clelland, *ibid.* iii. p. 401, pl. xiii, xiv; *C. lyratus*, Schinz; *C. dimorphe*, Hodgson; *Panolis acuticornis*, Gray. *T'hdmine* of Burmese, *Sungrai* of Manipur.

It inhabits Pegu, and thence northward to the valley of Manipur, and southward to Mergui and the adjacent northern part of the Malayan peninsula. In Cambodja and the island of Hainan it is replaced by a nearly allied race, *P. smithii*,\* subsequently *C. platyceros* of Dr. Gray;† and interposed between the two races of *Panolis* there would appear to occur the fine

\* *Cervus smithii*, Gray, P. Z. S. 1837, p. 45.

† *vide* P. Z. S. 1867, p. 841, figs. 22 and 23.



*Rucervus schomburgki*, Blyth, which is a Siamese representative of the Indian *R. duvaucelli*, and doubtless similar in its habits. For illustrations of the horns of all four species, *vide* Proc. Zool. Soc. 1867, p. 835, figs. 1-23. The earliest figure of the horns of *P. eldi* is given, with a portrait of its discoverer, Lieut. Eld, in the Bengal Sporting Magazine.\*

This remarkable Deer is a highly gregarious species, resorting to openings in the forest, like the Indian Bárá-sing'ha, *Rucervus duvaucelli*.†

\*118. *CERVULUS AUREUS* (J. 223).

*Stylloceras aureus*, H. Smith, G.A.K. iv. 148, t. v. 805.

*Gee*, or Barking Deer.

The diminutive Deer of this form, commonly known as Muntjacs, are generally distributed over the hill forests of north-east Asia and its islands; but examination of a series of skulls from different localities in the Museum of the London Royal College of Surgeons inclines me to think that the various species of them have not been satisfactorily made out. That of Java, *C. vaginalis*, Boddaërt, is one of the most distinct, and has considerably larger horns than any of the others; again, the small *C. reevesii*, Ogilby, of China is well distinguished; and Dr. Gray characterizes one from Cambodja as *C. cambojensis*,‡ which he has since identified with *Rucervus schomburgki*! The Burmese species differs in no respect that I am aware of from the ordinary Indian one, and again from that inhabiting the Malayan peninsula; but the Sumatran would appear to be somewhat different. It is the most numerous and universally diffused of all the Deer of Burma. More extensive materials for comparison of the different races than are at present available are needed for a final determination of the species of Muntjac Deer.§

*Fam. Capridæ.*

Goats, Sheep, and Antelopes in part.

\*119. *CAPRICORNIS SUMATRENSIS*.

*Antelope sumatrensis*, Shaw; Marsden, *Hist. Sumatra, Atlas*, pl. xiv; F. Cuvier, *Mamm. Lithog.*; *A. interscapularis*, Lichtenstein; *C. rubida*, Blyth; *C. swinhoei*, Gray, P. Z. S. 1862, p. 263, pl. xxxv; skull with horns from Arakan, figured *Cale. Journ. N. H.* i. pl. xii. *Tan-kseik*, Mason.

\* *l.c.* vol. xiv. 1839, p. 346.

† *vide* Lieut. Eld, *loc. cit.*, and especially Lieut. Beavan, in J. A. S. B. xxxvi. p. 175 *et seq.*, and P. Z. S. 1867, p. 759.

‡ P. Z. S. 1861, p. 138.

§ [Sir V. Brooke has since arranged the known species, P. Z. S. 1874, p. 33.—Ed.]



This species appears to be distributed from Arakan through Pegu to the extremity of the Malayan peninsula, and to occur in Siam and Formosa, and also in Sumatra.

This species varies much in colour, from red to black, and the black sometimes with a white nape, or the hairs of the nape may be white at the base only. Two flat skins from Arakan are of a pale red-brown colour; with black dorsal list, and quite resemble the figure of one from Formosa, which is styled *C. swinhoei*. The late Lieut. Beavan, again, described a female shot on "the grass and bamboo-covered sides of Zwagaben" mountain, near Maulmein, as being of a mingled black and ferruginous colour,\* and he mentions that the animal had been seen at Thayet Myo in Pegu. Mason also states that it is common on the mountains of Tonghoo, and Cantor obtained it from those of the Malayan peninsula. The "wild goat" mentioned by Crawford, as stated by the Siamese "to be found in some of the mountains of their country, and to be shot for their horns, which are prized by the Chinese for certain alleged restorative properties," can hardly be any other. On comparison of skulls from Sumatra, Arakan, and Mergui, I could detect no distinguishing character, and they differ little from those of *C. bubalina* of the forest region of the Himalaya, except in being considerably smaller. The genus is a very peculiar one, by no means so nearly related to the Goats and Gorals as is generally supposed, but examples of it should be studied in captivity before it can be thoroughly understood, and the skeleton of this form is a desideratum in European collections.

*Fam. Bovidae.*

The Bovine family.

\*120. *BOS GAURUS* (J. 238).

*Bos gaurus*, C. H. Smith. Fine skull figured in J. A. S. B. vi. p. 224; another *ibid.* x. 470. *Pygmy*.

The Gaur, or "Bison" of Indian sportsmen, is diffused in all suitable localities throughout British Burma, and its range extends southward to the straits of Singapore, but not to any of the islands. Nowhere does this grand species attain a finer development than in Burma, and the horns are mostly short and thick, and very massive, as compared with those of Indian Gaurs, though the distinction is not constant on either side of the Bay of Bengal. In the Malayan peninsula, where it is known as the *Salandang*, this animal would appear to be becoming extremely rare, at least to the southward; and

\* P. Z. S. 1866, p. 4.



we need information respecting its distribution in other parts of Indo-China. I have seen a characteristic skull from Johore, and once possessed a living calf, which was sent, together with a Malayan Tapir, from Singapore.

#### 121. *B. FRONTALIS*.

*Bos frontalis*, Lambert, Lin. Trans. vii. p. 57, pl. 4; *B. gavæus*, Colebrooke; P. Z. S. 1866, pl. 1, young bull; Hodgson, J. A. S. B. x. p. 470, skull, fig. 1.

#### The Gayal or *Mil'hun*.

In the domestic state only, the range of this fine species extends southward to the hills bordering on the Koladyne river, which flows into Akyab harbour from the north. In the hilly parts of Tippera and Chittagong it exists in the wild state. In the fully mature bull the horns are longer and the dewlap is considerably more developed than is represented in the figure cited.

#### \*122. *B. SONDAICUS*.

*Bos sondaicus*, S. Müller; *B. bentinger*, Temminck. *Tsoing* of Burmese.

The Banting inhabits Pegu, the Tenasserim provinces and Malayan peninsula, Sumatra, Borneo, and Java; being domesticated in the island of Bâli.

The hybrid with the Javan humped cow constitutes the *B. leucoprymnus* of Quoy and Gaymard, as the hybrid Gayal constitutes the *P. sylhetanus* of F. Cuvier. The Banting has bred in the Zoological Garden of Amsterdam, where I have seen bull, cow, and calf in fine condition. The bull, more especially, has an indication of a hump, which, however, must be specially looked for to be noticed; and he has a broad and massive neck like the Gaur, but no raised spinal ridge, nor has either of these species a deep dewlap like the Gayal. The cow is much slighter in build, with small horns that incline backwards; and she retains her bright chestnut colour permanently, while the bulls become black as they attain maturity, excepting always the white "stockings," and also the white patch on each buttock, which is characteristic of the species. In the old bull the cuticle between the bases of the horns becomes enormously thickened, corneous and rugged, and this begins to show before the coat has commenced to change colour, as may be seen in a stuffed specimen in the British Museum, which is that of an animal procured in Pegu by the author of this paper, and which lived for some time in the London Zoological Gardens. How far to the eastward the range of this animal extends in the Indo-Chinese countries, remains to be ascertained; but I have reason to believe that two other species of *Bos* there remain to be described, one of which is domesticated in Siam and the other in Cochin China.



123. *BUBALUS ARNI* (J. 239).*Bos arni*, Shaw.

The Indian Buffalo exists wild, whether or not indigenously so, and everywhere in the domestic state; and, as the calves obtain their full supply of milk, the tame Buffaloes in Burma assume their full development, and are not stunted in their growth, as in most parts of India. The Rev. F. Mason remarks that "there are great numbers of wild Buffaloes in the jungles of the South, which are supposed by the natives to be indigenous; but they are more probably of the domestic race that have run wild, like the wild Horses of America." The Indian Buffalo now abounds in a state of wildness in the north of Australia, where they have spread from Port Essington, and there are many in the delta of the Nile, where also they must needs have descended from domestic stock.

From Crawford's description of the animal it would seem that *Bos sondaicus* is domesticated in Siam. He, however, styles it *B. taurus*? "The *Bos taurus*," he remarks, "is found wild in the Siamese forests, and exists very generally in the domestic state, particularly in the northern provinces. Those we saw about the capital were short limbed, compactly made, and frequently without horns. They were generally of a red or a dark-brown colour, and never of the white or grey, so prevalent amongst the cattle of Hindustan. They also want the hump over the shoulders, which characterizes the latter. They are used only in agricultural labour, for their milk is too trifling in quantity to be useful, and the slaughter of them, publicly at least, is forbidden even to strangers. When, during our stay, we wanted beef for our table, our servants were obliged to go three or four miles out of town, and to slaughter the animals at night. The wild cattle, for the protection of religion does not extend to them, are shot by professed hunters on account of their hides, horns, bones, and flesh, which last, after being converted into jerk beef, forms an article of commerce to China."\*

*Fam. Tapiridæ.*

Tapirs.

124. *TAPIRUS MALAYANUS*.*Tapirus malayanus*, Raffles, F. Cuvier, Mamm. Lithog. i. p. 87. *Ta-ra-shu*, Mason.

The Malayan Tapir inhabits the Tenasserim provinces as high as the 15th deg. north lat.; also Lower Siam, the Malayan peninsula, Sumatra, and Borneo; if not likewise the southern provinces of China, where the species is not likely to be a different one. "Though seen so rarely,"

\* Embassy to Siam and Cochin China, ii. p. 192.





remarks Mason, "the Tapir is by no means uncommon in the interior of Tavoy and Mergui provinces; I have frequently come upon its recent foot-marks, but it avoids the inhabited parts of the country. It has never been heard of north of the valley of the Tavoy river."

*Fam. Rhinocerotidæ.*

*Rhinoceroses.*

125. RHINOCEROS SONDAICUS (J. 213).

*Rhinoceros sondaicus*, Cuvier; Horsfield, Zool. Res. in Java; S. Müller, Verhand. t. 33; *R. nasalis*, *R. stenorhynchus*, et *R. floweri*, Gray, apud Busk, P. Z. S. 1869, p. 416. *Khyen-hseu*, Mason.

The Lesser One-horned Rhinoceros. So far as I have been able to satisfy myself, this is the only single-horned Rhinoceros of the Indo-Chinese and Malayan countries, its range of distribution extending northward to the Gáro hills, where it co-exists with the large *R. indicus*, and to eastern and Lower Bengal. It would appear to be the only Rhinoceros that inhabits the Sundarbáns, occurring within a few miles of Calcutta; and yet I know of but one instance of its having been brought to Europe alive,\* and then it was not recognized as differing from *R. indicus*, which latter is not uncommonly brought down the Bráhmáputra from Assam, and sent to Europe from Calcutta. There is reason, also, to believe that *R. sondaicus* is the species which was formerly hunted by the Moghul Emperor Báber on the banks of the Indus. Southward it inhabits the Malayan peninsula, Sumatra, Java, and Borneo (?vide Busk, *loc. cit.*). It is about a third smaller than *R. indicus*, from which it is readily distinguished by having the tubercles of the hide uniformly of the same small size, and also by having a fold or plait of the skin crossing the nape, in addition to that behind the shoulder-blades. In *R. indicus* the corresponding fold does not thus meet its opposite, but curves backward to join—or nearly so in some individuals—the one posterior to the shoulders. A fine living male, before referred to, was exhibited for some years about Great Britain, and was finally deposited in the Liverpool Zoological Gardens, where it died, and its preserved skeleton is now in the anatomical museum of Guy's Hospital, Southwark. Two passable figures of it from life are given in the "Naturalists' Library," where it is mistaken for the huge *R. indicus*.

\* [Since Mr. Blyth wrote this paper, another example of this species is now alive in the Zoological Society's Garden.—J.A.]



*Rhinoceros sondaicus* is found at all elevations, as remarked of it by Dr. Horsfield, in Java; and from the mountains of Palouk, thirty miles north of Mergui, a writer quoted by the Rev. F. Mason observes—"We were on the summit of the highest range of mountains in the provinces. The tall timber trees at the first ascent were dwindled into a thick growth of stunted bushes, unmixed with a single shrub. The path, which was narrow and steep, had reached a level spot, that had been in the rains the wallowing place of a rhinoceros; for it has the habit of wallowing in the mire no less than the hog and the buffalo." The Sumatra Rhinoceros was also tracked by General Fytche to an altitude of about 4000 feet, when he obtained a close view of the animal with two finely developed horns.\* Crawford was assured at Bangkok that a thousand Rhinoceros horns were thence annually exported to China.

According to Helfer, the *R. indicus*, in addition to *R. sondaicus*, inhabits the northern portion of the Tenasserim provinces; and Mason asserts that a single-horned Rhinoceros from the Arakan jungles was purchased by the London Zoological Society, and lived for many years in the Regent's Park, the species in that case being unquestionably *R. indicus*. Again, according to a writer in the Oriental Sporting Magazine,† both species of one-horned Rhinoceros occur in Burma, and he cites, as his authority for the statement, a writer in the first series of the same periodical (vol. ii. p. 35), mentioning that his said authority appears to be "a thorough sportsman and no mean naturalist." I nevertheless hesitate, upon present evidence, to admit the Great Indian Rhinoceros into the list of Burmese animals.

#### 126. CERATORHINUS CROSSII?

*Rhinoceros crossii*, Gray, P. Z. S. 1854, p. 250, with figure of anterior horn, 32 in. in length over the curvature, and 17 in. in span from base to tip; *R. lasiotis*, Sclater.

Ear-fringed Rhinoceros. In the Rhinoceroses of this type the hide is comparatively thin, and is not tessellated or tuberculated, nor does it form a "coat of mail," as in the preceding; but there is one great groove (rather than fold or plait) behind the shoulder-blades, and a less conspicuous crease on the flank, which does not extend upwards to cross the loins, as represented in F. Cuvier's figure; and there are also slight folds on the neck and at base of the limbs; the skin being moreover hairy throughout. There is also a second horn placed at some distance behind the nasal one.

Until recently, the existence of more than one species was unsuspected. In 1868, a young female was captured in the province of Chittagong, and on

\* J. A. S. B. xxxi. p. 167.

† July, 1832, p. 301.



its arrival in the London Zoological Gardens, early in 1872, was believed to represent the *Rhinoceros sumatrensis* of Bell and Raffles; but soon afterwards another two-horned Rhinoceros was received at the same establishment from Malacca, obviously of a different species, which proved to be the veritable *R. sumatrensis*. Since its arrival, it has now (1873) considerably increased in size, and it probably is not yet quite full grown. As compared with *C. sumatrensis*, it is a considerably larger animal, with much smoother skin, of a pale clay-colour, covered with longer and less bristly hair, the latter of a light brown colour, as seen in the mass. The ears are placed much further apart at the base, and are not lined with hair as in the other, but are conspicuously fringed with long hair; and the tail is much shorter and largely tufted at the end. The horns are worn away, but if the species be truly assigned to *C. crossii*, the anterior would grow very long and curve to a remarkable extent backwards, while the posterior horn would probably be short. A second specimen of an anterior horn, almost as fine as the one first described, has recently turned up among the stores of the British Museum; and I found a smaller anterior horn of *R. crossii* in the Museum of the London Royal College of Surgeons, confirmatory of its peculiar shape. In this group the horns are remarkably slender except at the base, and of much more compact texture than in other Rhinoceros horns. I have reason to believe that this is the two-horned species which inhabits the Arakan hills, those of northern Burma, and which extends rarely into Assam; and I think it highly probable that the skull figured in Journ. As. Soc. B. xxxi. p. 156, pl. iii. f. 1, represents that of *C. crossii* (seu *R. lasiotis*), in which case the range of the species would extend into the Tenasserim provinces. A detailed notice of the individual sent to London has been given by Dr. Anderson.\*

#### 127. *C. SUMATRENSIS.*

*Rhinoceros sumatrensis*, Bell, Phil. Tr. 1793, p. 3, pl. 2, 3, 4; *R. javanus*, F. Cuv. Mamm. Lithog., very young; *C. blythii*, Gray, Ann. M. N. H. (4), vol. xi. p. 360. *Kyen-shan*, Mason.

The Sumatran Rhinoceros is much smaller than the preceding species, with a harsh and rugose skin, which is black, and clad with bristly black hairs; the ears less widely separated at base, and filled internally with black hairs; the muzzle anterior to the nasal horn much broader; and the tail conspicuously longer, tapering, and not tufted at the end. Horns attaining considerable length, and curving but slightly backwards, as represented in Journ. As. Soc. B. xxxi. p. 156, pl. iv. f. 1.

\* P. Z. S. 1873, p. 129.





This is the ordinary two-horned Rhinoceros of the Ténasserim provinces, extending into Siam, and southward throughout the Malayan peninsula and Sumatra; but in Borneo there would appear to be a still smaller species, which is referred to the same by Professor H. Schlegel. How far northward its range extends has not been ascertained, but I suspect that it does not occur in Arakan. A Rhinoceros of some kind inhabits the province of Quang-si, in China, in lat. 15 deg. N., as noticed by Du Halde. In general, this is an exceedingly shy and timid animal, but it has been known to attack the night-fires of travellers, as happened once to Professor Oldham. In this case the animal was shot, and its skull is now in the Museum of Trinity College, Dublin, where I have verified it as appertaining to the present species. For remarks on this and the preceding species, *vide* Ann. M. N. H. (4), vol. x. (1872), p. 399. Lieutenant Newbold noticed the existence of the "Badok, or Sumatran Rhinoceros" in the Malayan peninsula in 1838.\*

#### Order SYRENIA.

##### *Fam. Halicoridæ.*

#### 128. HALICORE DUGONG (240).

*Trichechus dugong*, Erxleben, F. Cuvier, Mamm. Lithog. ii. 120; Zool. Aristolabe, Atlas, t. 27.

The Malayan Dugong. Mason records that the existence of this animal in the Mergui archipelago was brought to his notice by the late Rev. S. Benjamin in 1853. It is occasionally obtained by the Andaman Islanders. Finlayson strangely asserts that in this animal "a single spiraculum opens near the top of the head."

##### *Fam. Manidæ.*

##### Pangolins.

#### \*129. PANGOLINUS LEUCURUS.

*Manis lucurus*, Blyth, J. A. S. B. xi. p. 454; xvi. p. 1274. *Theu-khioe-ghyat*, Mason.

Burmese Pangolin. Ranges from Arakan to Mergui, and is probably the species "closely allied to *javanicus*" observed by Dr. Anderson near Bhamo. From Malacca I have only seen the *P. javanicus*, Desmarest, and it is probable that *P. auritus*, Hodgson, 1836 (*Manis dalmanni*, Sundevall, 1842, *M. multiscutata*, Gray, 1843), occurs to the northward. From Cambodja Dr. Gray gives *P. pentadactyla* (*Pangolinus typus*).

\* Madras Journ. Lit. Sc. vii. p. 70.





## Province SAUROPSIDA.

## Class AVES.

## Sub-class CARINATÆ.

## Order PREHENSORES.

## Fam. Psittacidæ.

## Parrots.

## \*1. PALÆORNIS ALEXANDRI (J. 147).\*

*P. eupatrius*, L., adopted by Dr. Finsch, *Die Papageien*, tom. ii. p. 11. *Kyai-phoung-ka*.

A mountain species in British Burma, chiefly or wholly confined to the

\* It is probable that more species of PALÆORNIS remain to be discovered in the Indo-Chinese peninsula. Some of them are very local, as *P. COLUMBOIDES* (J. 150), which is confined to the mountains of S. India, as *P. CALTHROPÆ* is to those of Ceylon. *P. ERYTHROGENYS*, nobis (*P. nicobaricus*, Gould, *B. As.* pt. ix. pl. 13), is known only from the Andaman and Nicobar Islands. *P. CANICEPS*, nobis (Gould, *B. As.* pt. ix. pl. 12), was founded on a mutilated specimen obtained alive from a Nicobar savage, and a black-billed (and probably, therefore, female) example of it was subsequently procured by the late Dr. Cantor in Province Wellesley. These were the only specimens known, when Herr v. Pelzel obtained it in the Car Nicobar, and quite recently I saw three in a collection, which also contained two of *P. ERYTHROGENYS*, but whence obtained could not be learned, and there were no species peculiar to the Andaman or Nicobar Islands together with them, though several common to the Tenasserim provinces and Malayan peninsula. The fine *P. DERBIANUS* (*P. Z. S.* 1850, pl. 25; Gould, *B. As.* pt. x. pl. 9) is only known from a single specimen, the habitat of which could not be ascertained; and *P. BARBATUS*, Gm. (*Souance Rev. Zool.* 1856, p. 209; *P. luciani*, Verreaux, *P. erythrogenys*, Fraser, *P. Z. S.* 1850, pl. 26; Gould, *B. As.* pt. ix. pl. 11), is yet another species of which the habitat has only recently been ascertained, viz. Western China (Sze-chuen), though three or four specimens of it were preserved in different museums. All of these birds, excepting the first-mentioned two (from S. India and Ceylon), are nearly akin to *P. VIBRISCA*, though well distinguished in every instance; and the last three of them are not unlikely to prove indigenous to different parts of the Indo-Chinese countries. *P. LONGICAUDATUS* (Gould, *B. As.* pt. x. pl. 10, 11); *P. malaccensis* (Gmelin, nec Latham); *P. erythrogenys* (Lesson, and of which





loftier elevations. Mason remarks that he never observed it in the provinces of Tavoy and Mergui. Schomburgk, however, notes it from Siam.\*

[*Palæornis eupatrius*, Lin., is the correct title. *Psittacus alexandri*, Lin., belongs to the Javan parrakeet.]

2. \*P. TORQUATUS (J. 148).

*Kyai-gyot.*

Resorts to open country as elsewhere, and is therefore chiefly met with in the interior, beyond the maritime belt of forest. Dr. Cantor procured it so far southward as in Province Wellesley.

[Thayet Myo (*Wardlaw Ramsay*).]

3. \*P. SCHISTICEPS (J. 150).

*P. schisticeps*, Hodgs.; Gould, *B. As.* pt. x. pl. 8.

Mountains of Arakan.

[Tonghoo hills (*W. R.*). The Tonghoo bird belongs to the race named *P. finschii*, Hume (*Str. Feath.* ii. p. 509).]

4. \*P. CYANOCEPHALUS (J. 149, *partim*).

*P. cyanocephalus*, Lin.; Edwards, pl. 233. *Kyai-ta-ma*.

Exceedingly common in the forests of British Burma, where it takes

*P. affinis*, Gould, and *P. viridimystax*, nobis, are the young), belongs to the southern half of the Malayan peninsula, with the islands of Sumatra and Borneo, and *LORICULUS GALGULUS* has exactly the same range of distribution; the latter being replaced in Java by *L. FUSILLUS*, G. R. Gray; which is closely akin to *L. VERNALIS* of India and Burma, it being, however, well distinguished, which is more than can be averred of *P. VIBRISCA* as inhabiting the same island.

[The Andaman race of *P. erythrogeus* (*P. affinis*, Tytler, *P. tytleri*, Hume) slightly differs. *P. derbyanus* is not generally admitted to be distinct from *P. melanorhynchus*, Wagler. It is not certain whether the title *Psittacus barbatus*, Gm., should not be expunged. It was given to Latham's *bearded parrakeet* (*Syn.* i. p. 238, no. 38), described from a specimen, origin unknown, in the Hunterian Museum. Examples of the species, *P. luciani*, are so rare, that a comparison with Latham's description is difficult to make. Eventually examples exhibiting the phase of plumage described by Latham may be met with; in the mean time it seems best to follow Dr. Finsch and adapt Verreaux's title.]

\* The Indo-Chinese bird should now be compared with the Andaman race, as described by Mr. V. Ball (*J. A. S. B.* xli. pt. ii. p. 278).

[I have compared a large series of Burmese and Andaman individuals, and find that the latter differ by having the bills considerably larger.]



the place of *P. ROSA* (Boddaërt) of India generally and Ceylon. In Nipāl both species occur, but the present one only (if I mistake not) in Lower Bengal, and its range extends eastward to the south of China. There are various distinctions, one of which is that in *P. ROSA* the wings are blue on the inner side, while in *P. CYANOCEPHALUS* they are green within. *P. ROSA* is also a much more finely coloured bird than the other, and has a conspicuously longer tail.

[Rangoon, Karen hills, Tonghoo (*W. R.*). Linnæus's title of *Psittacus cyanocephalus*, founded on Brisson's *Psittaca cyanocephala* (Orn. iv. p. 359, no. 70, pl. xix. f. 2, "East Indies"), applies to this race. While *Psittacus purpureus*, P. L. S. Müller (Suppl. p. 74, no. 6, d.), founded on the *Perruche à tête rouge de Gingi* (Daubent. Pl. Enl. 264), *Psittaca gingiana erythrocephala*, Briss. (*t.c.* p. 346, no. 65, pl. 29, f. 2, "royaume de Gingi"), as shown by the late Mr. Cassin, ten years ago (*P. Ac. N. Sc. Philadelphia*, 1864, p. 239), must take precedence of Gmelin's title of *Psittacus erythrocephalus* (*S. N. i.* p. 325, No. 74 ex Briss.). Mr. G. R. Gray (*H. List*, ii. No. 8054), who followed Cassin, adopted P. L. S. Müller's title, and retained it, rather vaguely, for the species inhabiting "India and Ceylon," while restricting Gmelin's title of *bengalensis* to the Nipalese form. Curiously enough, Mr. Gray wrongly associated P. L. S. Müller's title of *purpureus* with Daubenton's plate, No. 888, on which Boddaert founded his title of *Psittacus rosa* (Table, p. 53). There does not appear to be conclusive proof of both species occurring in Nipal, but *conf.* Jerdon, in *Ibis* (1872, p. 6, No. 149). The title of *Psittacus rosa*, Boddaert, strictly pertains to the Bengal form.]

5. \**P. VIBRISCA* (J. 152).

*Psittacus ponticerianus*, Gmelin; *P. alexandri* (L.), apud Finsch, *Die Papageien*, tom. ii. p. 59; *P. modestus*, Fraser, the young.

An exceedingly common species in the forests of British Burma, and Mason remarks of it (in particular) that "immense flocks of Parrakeets may be seen simultaneously descending on the rice-fields, where persons have to be in constant attendance to drive them away during the season of harvest;" while of *P. TORQUATUS* he notices that it is "often seen in the rice-fields, but in smaller companies, which have not the habit of simultaneous descent." Westward, the present species is common in the Terai region of the E. Himalaya, but its range does not extend further into India, whence its synonym of *ponticerianus* is a misnomer. Great numbers of the very young are brought every season to Calcutta from Chittagong, and it is remarkable



that from the earliest age the males only have the upper mandible coral-red. In a presumed female which I possessed in captivity, the upper mandible changed from black to coral-red when the bird was about eighteen months old; and I have seen numerous specimens which had been killed when the change was in progress. I have also shot red-billed and black-billed specimens out of the same flock, and therefore cannot admit the *P. nigrirostris*, Hodgson, as a distinct species, differing only in the colour of the upper mandible. Moreover, the same sexual diversity in the colouring of the bill, whether permanently or otherwise, occurs in several kindred species. Rarely, the lower mandible is also red in Burmese specimens, almost constantly so in Javanese examples; but I have been unable to detect the slightest difference of plumage on comparison of skins from Nipāl, Arakan, and Java.

[Rangoon, Tonghoo (*W. R.*). Assuming that the rose-breasted parakeets of the Indian Continent and Burma belong to one species, and those of Java and Borneo to another, it is not difficult to allot to the first their correct title. Mr. G. R. Gray (*t.c.* No. 8066), following Cassin (*l.c.*), adopted for the Indian species exclusively P. L. S. Müller's title of *Psittacus fasciatus*, bestowed by him (*t.c.* p. 74, no. 6, f.) on Daubenton's plate (*op. cit.* no. 517), and which subsequently served as the subject of *Psittacus vibrissa*, Boddaert, not *vibrisca* (*t.c.* p. 30), and of *Psittacus pondicerianus*, Gm. (*t.c.* p. 325, No. 73). This plate, as has been shown by Dr. Finsch, was taken from the Javan species, and therefore the titles cited fall before that of *Psittacus alexandri*, Lin. Wagler (*Monog.* p. 511) first bestowed a title, that of *Palæornis melanorhynchus*, on the Continental species, and by this it must be called.]

#### 6. *P. MELANORHYNCHUS.*

*P. melanorhynchus*, Wagler, nec Sykes; *Ibis*, 1873, p. 79; *P. nigrirostris*, Hodgson, *partim*, vide *Calc. Journ. N. H.* vii. p. 560.\*

A most closely allied species to the last, from the Tenasserim provinces, if not also the base of the Eastern Himalaya. As seen alive, together with examples of the preceding, the difference is more conspicuous from its purely white irides, whereas the other has dark irides. The cap has a slight tinge of verditer, but no trace of ruddy colouring, and the red of the breast is continued past the black moustachial streak and the ear-coverts,

\* It is worthy of notice that Mason designates the bird, not distinguishing the two races, as the "black-billed Parrakeet."



so as to form a half-collar bordering the sides of the cap; it also does not descend so far on the abdominal region, a larger portion of which is green than in the other. These differences are conspicuous in the living birds when seen together. All hitherto examined have the bill black, but in the male it is probable that the upper mandible is coral-red. A living specimen in the London Zoological Gardens is alleged to be from Kashmir, which is certainly a mistake. There are skins in the British Museum which are positively from the Tenasserim provinces.

[The facts here stated are quite new. I am not aware that they have ever been previously published. Dr. Jerdon certainly was unacquainted with them. Further investigation is most desirable; more especially as Mr. Blyth is completely at issue on many points with what has been averred by Mr. Hume. My own experience does not accord with Mr. Blyth's opinion.]

#### 7. PSITTINUS MALACCENSIS.

*Psittacus malaccensis*, Latham, nec Gmelin; *P. incertus*, Shaw; Swainson's *Ill. Orn.* pl. 154.

This common Malayan species occurs in Mergui province. It is essentially a short-tailed *Palæornis*, but with affinity to *Tanygnathus*.

[Blyth's generic title *Psittinus* is absorbed by Dr. Finsch in Kuhl's *Psittacula*. Latham's specific title *malaccensis* is also by the same author superseded, on the ground of its conveying an erroneous idea of the geographical range, and Shaw's title *incertus* is adapted. A better or more acceptable reason is that Gmelin and Latham named two distinct species of Asiatic parrots by the title of *malaccensis*.]

#### 8. \*LORICULUS VERNALIS (J. 153).

*Kyai-tha-da*.

Generally diffused in the forests.

[Tonghoo (*W. R.*).]

### Order RAPTORES.

#### Fam. Falconidæ.

#### 9. FALCO PEREGRINATOR (J. 9).

*Falco peregrinator*, Sundev.; Gould, B. As. pt. iii. pl. 2; *F. communis*, var. (?) Raffles, ex Sumatra.

It is asserted by Mason that I showed him a skin of this Falcon received



from Burma, though I have no recollection of the circumstance. It is, however, a most likely species to occur there, as is also *F. peregrinus*, in suitable localities, where ducks resort plentifully. *F. peregrinator* would appear to be chiefly a Malayan species, and the specimen of it originally obtained by Sundevall was obtained on board ship, in lat 6°, between Ceylon and Sumatra, about seventy miles from the Nicobar Islands.

[Major Lloyd has sent me an undoubted example of this Falcon, shot near Tonghoo.]

[10. *F. PEREGRINUS* (J. 8).  
Prome (*Oates*).]

11. *HYPOTRIORCHIS SEVERUS* (J. 14).

Tenasserim. Inhabits from the S. E. Himalaya to Java and the Philippines, but has not hitherto been met with in the plains of India. Mr. Holdsworth notes it from Ceylon.

\*12. *TINNUNCULUS ALAUDARIUS* (J. 17).

*Gyo-theing*.

Common. *T. saturatus*, nobis,\* from the Tenasserim provinces, is perhaps a distinct race, remarkable for the great development of the black markings on its plumage; but it requires further confirmation.

[Tonghoo (*Lloyd*), Karen nee (*W. R.*), Thayet Myo (*Feilden*).

*Tinnunculus atratus*, Blyth, apud G. R. Gray, H. L. No. 212, *ex* Burma, is a misprint for *T. saturatus*, Blyth.]

[13. *ERYTHROPUS VESPERTINUS*? (J. 19).

Mr. Hume has thus, with doubt, identified an example sent to him by Captain Feilden from Thayet Myo.]

14. *POLIOHIERAX INSIGNIS*.

*Poliohierax insignis*, Walden, P. Z. S. 1871, p. 627; *Lithofalco feildeni*, A. O. Hume, P. A. S. B. 1872, p. 70.

Upper Pegu.

\*15. *HIERAX EUTOLMUS* (J. 20).

*Falco carulescens*, apud Stoliczka, J. A. S. B. pt. 2, xxxix. p. 282. *Keung-co-hnouk*. Arakan, Pegu, Tenasserim, Siam.

[The title of *Microhierax*, Sharpe, must be employed for this genus.]

\* J. A. S. B. xxii. p. 277; Ibis, 1866, p. 238.



16. *H. FRINGILLARIUS*.

*H. fringillarius*, Drapiez; *H. malayensis*, Strickland; *Falco caeruleus*, apud Vieillot, Gal. des Ois. t. 18; Pl. Col. 97.

Malayan Peninsula, Sumatra, Java, Borneo. Obtained by Helfer, probably in Mergui province (specimen in Calcutta Museum). In the north of Arakan, *H. melanoleucus*, nobis,\* will most probably be found to occur, as it has been obtained in the province of Kachar.

[Meeta Myo (*Davison*).]

\*17. *BAZA LOPHOTES* (J. 58).

Arakan, Tenasserim, Malacca.

18. *PERNIS PTILORHYNCHUS* (J. 57).

A long-crested specimen received from Mergui, and described as *P. brachypterus*.† Its primaries were not fully grown. Mr. A. O. Hume notes it from Burma and Siam.

[Tonghoo (*W. R.*), Thayet Myo (*F.* and *O.*)]

\*19. *ELANUS MELANOPTERUS* (J. 59).

Arakan, Tenasserim. "Various localities in British Burma" (*A. O. Hume*).

[Thayet Myo (*W. R.*), Arakan (*O.*).]

\*20. *SPILORNIS CHEELA* (J. 39).

*Doung-taewoon*.

Common in Arakan, if correctly identified, as is most probable. The nearly allied but smaller race, with shorter crest, *S. bacha* (Daudin); *Falco bido*, Horsfield; *Hæmatornis spilogaster*, nobis; *H. elgini*, Tytler, inhabits the Andamans, South India, and Ceylon, as also Malacca and Java; and, according to Messrs. Swinhoe and Gurney, is an intermediate race.

[Tonghoo (*W. R.*); Thayet Myo (*F.*). *S. elgini*, Tytler, is undoubtedly a distinct species. Nor can I agree to unite *S. spilogaster* with *S. bacha*. At Kalee Gunge Dr. Day obtained an adult bird, in the rich brown plumage of true *S. bacha*.]

21. *S. RUTHERFORDI*.

*S. rutherfordi*, Swinhoe, Ibis, 1870, p. 85.

Has been procured in the vicinity of Rangoon, in Siam, and Hainan.

[Said by Mr. Hume to have been obtained near Tonghoo. Neighbourhood of Amherst and Ye (*D.*).]

\* J. A. S. B. xii. p. 179 bis.

† J. A. S. B. xxi. p. 436.



\*22. *CIRCUS MELANOLEUCUS* (J. 53).*Thein-kyä.*

Arakan, Pegu, Tenasserim.

[Tonghoo (*W. R.*); Thayet Myo, Rangoon (*F.*).]\*23. *C. CINERACEUS* (J. 52).

Pegu, Tenasserim.

\*24. *C. SWAINSONII* (J. 51).

Arakan, Pegu.

\*25. *C. ÆRUGINOSUS* (J. 54).

Arakan, Tenasserim.

[Tonghoo, Rangoon (*W. R.*).]26. *POLIORNIS TEESA* (J. 48).

Common in Province Amherst.

[Tonghoo (*W. R.*); Thayet Myo (*O.*). Hodgson's generic title, *Butastur*, takes precedence over *Poliornis*, Kaup.]27. *P. INDICUS*.*Falco indicus*, Gmelin; *F. javanicus*, Latham; *Buteo poliogenys*, Temminck, *Fauna Japonica*, pl. vii. B., where printed *pyrrhogenys*; *B. pygmaeus*, nobis, J. A. S. B. xiv. p. 117; *Astur barbatus*, Eyton.According to Mr. A. O. Hume, this species "has now occurred on several occasions in Southern Burma." The specimen described as *Buteo pygmaeus* was obtained by Helfer. One procured by Mr. Swinhoe in Formosa had a crested occiput.\*28. *P. LIVENTER*.*P. liventer*, Temminck, p.c. 438.An example from Tonghoo, identified by Viscount Walden;† Siam (*Gurney*).[Tonghoo (*W. R.*); Thayet Myo (*O.*). To Major Lloyd belongs the credit of having first discovered that this species was an inhabitant of Burma, where, judging by the number of examples sent to me, it appears very common.]\* *Ibis*, 1864, p. 429.† *Tr. Z. S.* viii. p. 37 (1871).





## \*29. ACCIPITER VIRGATUS (J. 25).

Arakan, Tenasserim. Common.

[Thayet Myo (*F.*). Captain Feilden was good enough to send me the example here noted, and which I provisionally identify with *A. virgatus*. In Mr. Sharpe's opinion it may belong to the race named *A. stevensoni* by Mr. Gurney. The latter gentleman, however, as will be seen below, identified, although with doubt, this Thayet Myo example as belonging to "*A. rhodogaster*, nearly adult." Above, the plumage is dark cyanous. The breast is dove-coloured, without a trace of rufous. The abdomen pure white, with dove-coloured bands. The ventral region and under tail-coverts pure white; also the throat, with the exception of a mesial line of ash-coloured feathers. Tarsus, 2; wing, 6.25; tail, 5.50.]

## 30. TERASPIZIAS RHODOGASTRA.

*Nisus rhodogaster*, Schlegel; Tr. Z. S. vol. viii. pt. ii. p. 33, pl. 11.

Mr. Gurney thus identifies a specimen sent to Lord Walden from Thayet Myo.

[This refers to the example above mentioned. It is, however, highly improbable that a species peculiar to Celebes should occur in Burma.]

## \*31. MICRASTUR BADIUS (J. 23).

*Thinkyet-oma*.

Arakan, Siam, Hainan. Common. *M. soloënsis*, Horsfield, should be looked for, as it was obtained in the Car Nicobar by Herr v. Pelzeln.\* *Nisus minutus*, Lesson, is identified with it by Dr. Pucheran,† being founded on a specimen alleged to have been received from the Coromandel coast. Prof. Schlegel notes it from Java, Celebes, the Philippines, and China.

[Tonghoo, Karen hills, at 4000 feet of elevation (*W. R.*); Pahchaun, Pabyouk, Pahpoon (*D.*). The Burman race of this species has been separated by Mr. Hume, under the title of *Micronisus poliopsis*, Str. Feath. ii. p. 325.]

## \*32. LOPHOSPIZIAS TRIVIRGATA (J. 22).

Arakan, Tenasserim.

[Eastern slopes of the Pegu hills (*O.*); pine forest north of Kollidoo (*D.*). Hodgson's title of *indicus* is adopted by some authors for the somewhat larger Nipalese race of this Sumatran species.]

\* *Reise "Novara," Aves*, 1850, p. 12.† *Rev. Zool.* 1850, p. 210.



\*33. SPIZAËTUS LIMNAËTUS (J. 34).

Arakan, Tennasserim, Malacca, Sumatra.

[Tonghoo (*W. R.*); Thayet Myo (*O.*).]

34. *S. ALBONIGER*.

*S. alboniger*, nobis, J. A. S. B., xiv. p. 173; Gould, B. As. pt. xv. f. 1.

Mergui, Malacca, Borneo.

\*35. AQUILA BIFASCIATA (J. 27).

Won-lo.

Specimen received from Arakan, in the phase of plumage figured as *A. bifasciata* by Hardwicke and Gray.\*

\*36. *A. NÆVIA*? (J. 28).

*A. orientalis*, Cab., Gurney, Ibis, 1872, p. 329.

Arakan.

\*37. *A. FUSCA* (J. 30).

*A. fusca*; vide Mr. A. Anderson, P. Z. S. 1872, pp. 69, 622; *Morphnus hastatus*, Lesson.

Arakan.

[The author of the title, *A. fusca*, is not written in the MS.]

38. HIERAËTUS PENNATUS (J. 31).

Moulmein.

I have seen a Spanish specimen with rudimentary occipital crest, as usual in Indian examples.

[Thayet Myo (*F.*).]

39. NEOPUS MALAYENSIS (J. 32.)

Tenasserim provinces.†

\*40. PANDION HALIAËTUS (J. 40).

Won-let.

Arakan, Tenasserim. Common.

\*41. POLIOAËTUS ICTHYAËTUS (J. 41).

Common.

[Tonghoo (*W. R.*); Pabyouk (*D.*).]

\* Vide Mr. W. E. Brook, P. Z. S. 1872, p. 502, and Mr. A. Anderson, *ibid.* p. 620; also Dresser, *ibid.* 1872, p. 863; and H. Gurney, Ibis, 1873, p. 99.

† P. Z. S. 1868, pl. 34.



42. *P. HUMILIS*.*Falco humilis*, S. Muller; *Icthyæetus nanus*, nobis.

Burma, *vide* Viscount Walden. Mr. W. E. Brooks identifies *Haliaeetus plumbeus*, Hodgson,\* with this species.

\*43. *BLAGRUS LEUCOGASTER* (J. 43).

A common maritime species which preys chiefly on sea-snakes.

\*44. *HALIASTUR INDUS* (J. 55).

Common, extending southward to Malacca.

[Tonghoo (*W. R.*); Thayet Myo (*O.*).]

\*45. *MILVUS GOVINDA* (J. 56).*Tucon-boke*.

Common in the cold season. At Bangkok it is as abundant as in Calcutta. Cantor procured it at Pinang.

[46. *M. AFFINIS*.*M. affinis*, Gould, P. Z. S. 1837, p. 140.

Thayet Myo examples, obtained by Mr. Oates and Captain Feilden, are thus identified by Mr. Hume.]

[47. *BUTEO PLUMIPES* (J. 47).

A Buzzard obtained by Captain Feilden at Thayet Myo is identified by Mr. Hume as *B. japonicus*, Schlegel.]

*Fam. Vulturidæ.*

## Vultures.

48. *VULTUR CALVUS* (J. 2).*Vultur calvus*, Scopoli; Gould, B. As. pt. xi. pl. 1.

Not a common species.

49. *GYP S INDICUS* (J. 4).*Vultur indicus*, Scopoli; Gray and Mitchell, Gen. Birds, pl. 3, immature plumage.

Arakan, Siam. Vultures assigned to this species are mentioned to have been obtained on Zwagaben mountain by Lieut. Beavan.† I have seen two specimens of *G. indicus* in a Malacca collection. No doubt a Vulture of any kind is there rare, or it would not have been deemed worthy of preservation.

\* J. A. S. B., xli. pt. i. p. 73.

† P. Z. S. 1866, p. 3.





According to Sir T. Stamford Raffles, "Vultures are rare on the west coast of Sumatra, but are occasionally seen on the Malay peninsula, and at Pinang."\* Mr. E. W. H. Holdsworth notices that the *Vulturidæ* are absent from Ceylon;† and Mr. Wallace asserts the same of the entire Malayan archipelago.‡

[Upper Pegu (O.).]

50. *G. BENGALENSIS* (J. 5).

*Leu-ta.*

"Often seen in great numbers, even in the suburbs of large towns" (*Mason*). I noticed a few about Akyab only. Cantor procured it in Province Wellesley.§ It abounds as much in Siam as in Bengal.

[Thayet Myo (*Hume*); Pabyouk (*D.*).]

### *Fam. Strigidæ.*

#### Owls.

51. *HUHUA NIPALENSIS* (J. 71).

Specimen in nestling garb, obtained by Colonel Tickell upon Moulè-it mountain, and described by him as *Ptiloskelos amherstii*.|| This species has been confounded with the Malayan *H. orientalis* (Horsfield), which is a much smaller kind, and otherwise differs considerably. The young of both are in the British Museum, which enables me to confirm the present identification.

[Tonghoo (*W. R.*).]

\*52. *ASCALAPHIA BENGALENSIS* (J. 69).

Arakan.

\*53. *A. COROMANDA* (J. 70).

Arakan.

54. *SCOPS LETTIA* (J. 75).

Arakan, Tenasserim. Identical with Himalayan specimens.

[Rangoon, Karen hills (*W. R.*); Thayet Myo (*F.*). The Rangoon and Karen examples are not separable from Malaccan individuals. But they are distinct from true *S. lempiji*, Horsf., which is from Java.]

\* Tr. L. S. xiii. p. 277.

† P. Z. S. 1872, p. 406.

‡ Ibis, 1868, p. 2.

§ P. Z. S. 1854, p. 258.

|| J. A. S. B. vol. xxviii. p. 448.



\*55. *S. BAKKAMUNA* (J. 74).

*S. pennata* et *S. sunia*, Hodgson; Gould, B. As. pt. xxii. pl. 3.

Arakan. *Otus mantis*, S. Müller, which is *S. rufescens*, Horsfield, is dubiously stated by Mr. A. O. Hume to have been found in Burma.

[Thayet Myo (*F. fide Hume*).]

\*56. *KETUPA CEYLONENSIS* (J. 72).

*Tec-dok*.

Arakan. The common Indian species, an example of which was obtained by Canon Tristram in the valley of the Jordan. Its range extends eastward to China.

[Tonghoo (*W. R.*); common from Thayet Myo to Tonghoo (*O.*); Amherst (*D.*).]

57. *K. JAVANENSIS*.

*K. javanensis*, Lesson; *Strix ketupa*, Horsfield; *Strix ceylonensis*, apud Temminck, P. C. 74.

One received from Ramri Island, Arakan; also Siam. Common in the Malayan peninsula and archipelago.

[Amherst (*D.*).]

\*58. *ÆGOLIUS BRACHYOTUS* (J. 68).

*Brachyotus accipitrinus* (Gm.), Ibis, 1872, p. 328.

Arakan.

[*Asio accipitrinus* (Pallas) is the correct denomination of this Owl. Those authors who may desire to generically separate it from the long-eared Owl, will have to adopt the generic title of *Brachyotus*, Gould, and not that of *Ægolius*, K. and B., previously employed by Kaup as the generic title of *S. tengmalmi*.]

\*59. *ATHENE WHITELEYI* (?).

*Athene whiteleyi* (?), Blyth, Ibis, 1867, p. 313; *A. cuculoides* (?).

Arakan, Tenasserim. Common.

*A. castanoptera*, Horsfield, a Javanese species, is mentioned by Helfer; and an example of the Indian *A. radiata* was obtained by Dr. Cantor from Keddah.\*

[Rangoon, Tonghoo, Yey-tho (*W. R.*); Thayet Myo (*O.*). The numerous individuals collected by Major Lloyd and Lieutenant W. Ramsay all belong to true *A. cuculoides*.]

\* P. Z. S. 1854, p. 262.



[60. *A. PULCHRA*.*A. pulchra*, Hume, Str. Feath. 1873, p. 469.Thayet Myo (*W. R.*).]61. *GLAUCIDIUM BRODIEI* (J. 80).*Noctua brodiei*, Burton; Gould, B. As. pt. xxii. pl. 4.

Obtained by Colonel Tickell upon Moulè-it mountain.

[Meeta Myo, Kyouknyat (*D.*).]\*62. *NINOX SCUTULATUS* (J. 81).*Khen-bok*.

Arakan, Tenasserim, Malacca. Common.

"Very abundant at Tavai; and though I never heard it at Moulmein, its familiar voice saluted me on the first night of my arrival at Tounghoo" (*Mason*).

[Karen hills (*L.*); Tounghoo (*W. R.*); Thayet Myo (*O.*); Pahpoon, Kyouknyat, Amherst (*D.*). Until comparison has been made with Sumatran examples, it will be best to retain the title of the Ceylon species, *N. hirsutus*, for the Burman *Ninox*.]

63. *SYRNIUM SELOPUTO*.

*Strix seloputo*, Horsfield; *Strix pagodarum*, Tem., P. C. 220; *S. sinensis*, vera? Latham, not of Hardwicke and Gray.

Mergui, Siam, Nicobar Islands. In Assam, according to Mr. A. O. Hume, this species apparently replaces the *S. ocellatum* of India, and it is "constantly found in Burma."

[Thayet Myo (*F.*). Identical with Malaccan examples. *S. sinensis*, Lath., founded on Sonnerat's *Hibou de la Chine* (Voy. Indes, ii. p. 185), can hardly refer to this owl.]

64. *S. INDRANI* (J. 63).

This should be the Burmese race, as it occurs at Malacca, as well as in South India and Ceylon; but Mr. A. Hume has a Burmese specimen, and suspects that "if the Nipāl and Nilgiri birds be distinct, the Burmese, Kumaon, Simla, and Kotegurh birds are intermediate between these two."\*

65. *PHODILUS BADIUS* (J. 62).*Strix badia*, Horsfield; Gould, B. As. pt. xxii. pl. 6.

Arakan, Tenasserim, Siam, Malay countries.

[Tonghoo, Karen hills (*W. R.*). Identical with Malaccan and Bornean examples.]

\* "Scrap-book," Part I. *Raptores*, No. 2, p. 351.



\*66. *STRIX JAVANICA* (J. 60).

*Strix javanica*, Gm.; Gould, B. As. pt. xxiv. pl. 1; *S. indica*, Blyth, Ibis, 1866, p. 250; nec *S. javanica*, apud Horsfield, as figured by Gray and Mitchell, Gen. Birds, pl. 15.

Common and generally diffused.

[Thayet Myo (*F.*). This is true *S. javanica*, Gm., founded on F. von Wurmb's *Nachteule von Java* (Magazin f. d. Neueste, iv. pt. 2, p. 10, no. 4, 1786). No Latin title was given by this author.]

67. *S. CANDIDA* (J. 61).

*S. candida*, Tickell; Gould, B. As. pt. xxiv. pl. 2.

Tonghoo. Occurs also in Central and Southern India, China, the Philippine Islands, and Australia.

[Tonghoo (*L.*).]

## Order INSESSORES.

Sub-order PICARIE.

## Tribe HALYCONES.

Fam. *Bucerotidæ*.

Hornbills.

\*68. *DICHO CEROS BICORNIS* (J. 140).

*Young-yen*, Arakan (*Phayre*). *Oukchingee* (Big-Hornbill), and sometimes *Yonia* (*Beavan*).

This fine Hornbill seems to be generally diffused through the forests, and is by no means rare, nor particularly shy. Southward its range extends to Malacca and Sumatra.\*

[Mong (*W. R.*); common on the western slopes of the Pegu hills (*O.*); Pahpoon, and 30 miles north of Ye (*D.*). Mr. Hume (Str. Feath. ii. p. 470) treats the Malaccan race as distinct. The characters which differentiate the Indian from the Malayan forms have yet to be recorded.]

\*69. *HYDROCISSA ALBIROSTRIS* (J. 142).

*Ouk-Khyen*.

The commonest species of Hornbill throughout British Burma.

[Tonghoo, Karen hills (*W. R.*).]

\* *Buceros cavatus* and *B. bicornis* are given as distinct species by Mr. W. H. Blanford, Ibis, 1870, p. 466. It can only be by a mistake of some kind.



70. *ANORRHINUS TICKELLI*.

*Buceros tickelli*, nobis, J. A. S. B. xxiv. pp. 266, 285; xxviii. p. 412; Ibis, 1864, pl. iii.

Mountains of Amherst Province, up to 4000 feet of elevation. A kindred species from the Nagas was referred to *A. galeritus* by Major Godwin-Austen,\* and is named *A. austeni* by Dr. Jerdon;† but it proves to be no other than the Malayan *Craniorrhinus corrugatus* (Tem. P. C. 520), the head being now in the possession of Lord Walden. *A. galeritus* is also a Malayan species.

\*71. *ACEROS PLICATUS* (?).

*Buceros plicatus* (?), Latham; *B. ruficollis*, nobis, J. A. S. B. xii. p. 176.

Chittagong, Kachar, Arakan, Tenasserim provinces, Malayan peninsula, Sumatra, Java (?). Javanese specimens appear to me to be somewhat different. In Tenasserim, remarks Mr. Barbe, both this species and the next are very common, associating in flocks of a dozen or twenty birds, but the two species do not mingle in the same flock.

[Dr. Day obtained this species in Assam.]

72. *A. SUBRUFICOLLIS*.

*A. subruficollis*, nobis, J. A. S. B. xii. p. 177.

Tenasserim provinces, Malayan peninsula. This species is very closely akin to the Papuan *A. ruficollis* (verus), the females being undistinguishable.

[Tonghoo (*W. R.*).]

73. *A. NIPALENSIS* (J. 146).

Munipur, Kachar, Tenasserim mountains.†

*Fam. Upupidæ.*

## Hoopoes.

74. *UPUPA LONGIROSTRIS*.

*Upupa longirostris*, Jerdon, B. of Ind. i. p. 393. *Toung pee-tsok*.

Tenasserim, Siam, Hainan.

This is hardly to be considered more than a deeply-coloured race of *U. epops*, and I have an impression that Arakan specimens are pale, like those of Lower Bengal and also of Europe.§

[Tonghoo, Thayet Myo (*W. R.*).]

\* J. A. S. B. xxxix. p. 96.

† Ibis, 1872, p. 6.

‡ For notice of the Hornbills of British Burma, *vide* Tickell, Ibis, 1864, p. 173 *et seq.*

§ *Cf.* Stoliczka, J. A. S. B. xli. pt. 2, p. 235; Sharpe and Dresser, Hist. of Birds of Europe, pt. vii.; Murie, Ibis, 1873, pp. 181 *et seq.*



## Fam. Alcedinidæ.

## Kingfishers.

## 75. CARCINEUTES PULCHELLUS.

*Carcineutes pulchellus* (Horsf.), Sharpe, *Mon. Alc.* pl. 96.

The range of this Malayan species extends to Mergui.

[Karen hills (*W. R.*); Amherst (*D.*). The examples from the Karen hills are absolutely identical with those Malaccan individuals which possess a rufous collar. This collar is strongly marked in these Karen specimens. But in many Malaccan specimens it is wanting. When in this common phase of plumage, they become the *C. amabilis*, Hume (*Str. Feath.* i. p. 474), founded on Upper Pegu examples obtained by Mr. Oates.]

## \*76. PELARGOPSIS BURMANNICA.

*Pelargopsis burmannica*, Sharpe, *Mon. Alc.* pl. 35. *Peing-nyen* (generic).

Arakan (?), Tenasserim provinces, Siam, Andaman Islands.

One of several geographical races which are barely separable.

[Yey-tho, Karen nee (*W. R.*); Thayet Myo (*O.*).]

## \*77. P. AMAUROPTERA (J. 128).

*P. amauroptera* (Pearson), Sharpe, *Mon. Alc.* pl. 30.

This species is seldom seen far inland, though in India it occurs in the *Tarai* at the foot of the Eastern Himalaya; being chiefly seen about estuaries where the water is brackish. It probably is nowhere more abundant than along the Tenasserim coast.

[Yey-tho (*W. R.*).]

## \*78. HALCYON PILEATA (J. 130).

*Halcyon pileata* (Bodd.), Sharpe, *Mon. Alc.* pl. 62.

Common.

[Palow (*O.*); Karope, Tavoy, Moulmein (*D.*).]

## \*79. H. COROMANDA (J. 131).

*H. coromanda* (Lath.), Sharpe, *Mon. Alc.* pl. 67.

Common, chiefly about estuaries.

[Meeta Myo, Amherst, Tavoy (*D.*).]

## \*80. H. SMYRNENSIS (J. 129).

*H. smyrnensis* (Linn.), Sharpe, *Mon. Alc.* pl. 59.

The most common species of its genus, as generally throughout Southern Asia.

[Rangoon, Tonghoo (*W. R.*).]





## \*81. SAUROPATIS CHLORIS (J. 132).

*Halcyon chloris* (Bodd.), Sharpe, *Mon. Alc.* pl. 87.

Common along the sea-coasts.

[Amherst, Henza Basin (D.).]

## \*82. CEYX TRIDACTYLA (J. 133).

*Ceyx tridactyla* (Pall.), Sharpe, *Mon. Alc.* pl. 40. *Deing-nyeen*.

Arakan, Tenasserim, Malacca.

[Eastern Pegu hills (O.); between Tavoy and Meeta Myo, Karope, Ye (D.).]

## \*83. ALCEDO BENGALENSIS (J. 134).

*Alcedo bengalensis*, Gm., Sharpe, *Mon. Alc.* pl. 2.

Common.

[Rangoon, Tonghoo, Karen nee (W. R.); Thayet Myo (F.).]

## \*84. A. ASIATICA.

*A. asiatica*, Swainson; *A. meninting*, Horsfield; Sharpe, *Mon. Alc.* pl. 5.

Tenasserim provinces. It is remarked by Mr. W. T. Blanford, that *Pelargopsis burmannica*, *Halcyon smyrnensis*, and *Alcedo bengalensis*, are apparently replaced in the Irawádi delta, where the water is salt, by *P. amauroptera*, *H. pileata*, and *A. asiatica*. According to Helfer, *Alcedo beryllina*, Vieillot (*biru*, Horsfield), is also an inhabitant of the Tenasserim provinces, but I have never seen it even from the Malayan peninsula. The present, however, is one of the species which Helfer did procure.

[This is probably *A. beavani*, Walden, for Mr. Hume remarks that Amherst and Ye examples are identical with individuals from various parts of India and from the Andamans. *A. meninting*, Horsf., the senior title of *A. asiatica*, is a perfectly distinct species.]

## \*85. CERYLE RUDIS (J. 136).

*Ceryle rudis* (Linn.), Sharpe, *Mon. Alc.* pl. 19.

Arakan, Tenasserim, Siam, Malacca, South China.

[Tonghoo (W. R.); Thayet Myo (O.).]

## [86. C. GUTTATA (J. 137).

*C. guttata* (Vig.), Sharpe, *Mon. Alc.* pl. 18.

Kollidoo, Pachaun (D.).]



## Fam. Coraciadæ.

Rollers.

## \*87. CORACIAS AFFINIS (J. 124).

*Coracias affinis*, McClell., Gray and Mitchell, Gen. Birds, pl. 211, not good. *Hynet-kha*.

Generally diffused, and always typically coloured; whereas specimens from Tippera, Sylhet, Assam, and Lower Bengal are mostly crossed more or less with *C. indica*, showing every gradation from one to the other. Gould's figure assigned to *C. affinis* in his "Birds of Asia"\* represents a hybrid of the kind; and *C. indica* also interbreeds with *C. garrula* in localities where those two races meet. Eastward, the present species extends at least to Siam.

[Rangoon, Tonghoo, Thayet Myo (*W. R.*).]

## \*88. EURYSTOMUS ORIENTALIS (J. 126).

Arakan, Tenasserim, Malacca.

## Fam. Meropidæ.

Bee-eaters.

## \*89. MEROPS PHILIPPINUS (J. 118).

*Merops philippinus*, Linn.; Gould, B. As. pt. vii. pl. 2.

Arakan, Tenasserim, Siam, Malacca, Sumatra, Java, Philippines, South China. The Philippine race does not, as has been asserted, differ in any respect.

[Tonghoo (*W. R.*); Thayet Myo (*O.*).]

## \*90. M. ERYTHROCEPHALUS (J. 119).

*M. erythrocephalus*, Gm.; Gould, B. As. pt. viii. pl. 13.

Arakan, Tenasserim, Siam, Malacca. The Javanese *M. quinticolor*, Vieillot, is distinguished by having no rufous above the black pectoral band.†

[Rangoon, Karen nee (*W. R.*); Thayet Myo (*F.*). The Malaccan habitat is doubtful. For reasons already stated (*Ibis*, 1873, p. 301), Gmelin's title, taken from Brisson, cannot be adopted. If, however, the title of *quinticolor*, Vieillot, is to be used for the Javan race, the continental form must take the name of *M. leschenaulti*, Vieill. In either view the necessity of coining the new title of *M. swinhoei*, Hume, does not seem apparent.]

\* Part xxi. pl. 2.

† P. Z. S. 1871, p. 348.



\*91. *M. VIRIDIS* (J. 117).*M. viridis*, var. *ferrugiceps*, Hodgson.

Arakan, Tenasserim provinces, Siam. *M. sumatranus*, Raffles, occurs in Siam, and should be looked for in the Southern Tenasserim provinces.

[Rangoon, Tonghoo hills, Karen hills (*W. R.*).]

\*92. *NYCTIORNIS ATHERTONII* (J. 122).*Nyctiornis athertonii* (J. & S.), Gould, B. As. pt. ii. pl. 2.

Tenasserim provinces.

[Tonghoo, Karen hills (*W. R.*).]

93. *N. AMICTA*.

*Merops amictus*, Temminck, P.C. 310; Swainson's Zool. Ill., 2nd series, pl. 56; Gould, B. As. pt. ii. pl. 3; *N. malaccensis*, Cabanis.

Procured by Helfer, probably in Mergui province.

[Near Zadee (*D.*). *N. malaccensis*, Cab., was described from the young bird.]

## Tribe COCCYGES.

## Fam. Capitonidæ.

## Barbets.

\*94. *MEGALÆMA MARSHALLORUM* (J. 191).*Megalæma marshallorum*, Swinhoe; Marshall's *Mon. Cap.* pl. 16. *Pko-goung*.

Arakan.

[Karen hills (*W. R.*). Mr. Hume has identified examples obtained by Mr. Davison at Kollidoo and Kyouknyat as belonging to *M. virens* (Bodd.), and not to the Himalayan bird.]

\*95. *M. HODGSONI* (J. 192).*M. hodgsoni*, Bp.; *M. lineata*, Marshall's *Mon. Cap.* pl. 36, 37.

Khásias, Arakan, Pegu, Tenasserim, Siam, Malacca (?), Java.

[Rangoon, Tonghoo, Yey-tho (*W. R.*); Thayet Myo (*O.*). Vieillot's title of *lineata* cannot be applied.]

\*96. *M. ASIATICA* (J. 195).*M. asiatica* (Lath.); Marshall, *Mon. Cap.* pl. 29. *Kok-kha-loung*.

Arakan, where not common.

[Tonghoo (*W. R.*); Pahpoon, Kollidoo (*D.*).]



97. *M. FRANKLINII* (J. 196).*M. franklinii* (nobis); Marshall, *Mon. Cap.* pl. 24.

Khásias, Tenasserim mountains.

According to Col. Tickell, this species "swarms from 3000 to 5000 feet elevation, not higher, nor lower, and from the first level it suddenly supplants *M. lineata* (*M. hodgsoni*?), the *Pokoung* of the Burmese."

[98. *M. RAMSAYI*.*M. ramsayi*, Walden, *Ann. N. H.* (4), 15, p. 400, June, 1875.Karen nee (*W. R.*).]\*99. *M. CYANOTIS*.*M. cyanotis* (nobis); Marshall, *Mon. Cap.* pl. 33, fig. 3.

Khásias, Tippera, Kachar, Arakan, Tenasserim provinces.

[Karen Hills (*W. R.*).][100. *M. MYSTACOPHANUS*.*M. mystacophanus* (Tem.), Marshall, *Mon. Cap.* pl. 19.Om-ben-gwen (*D.*).][101. *M. INCOGNITA*.*M. incognita*, Hume, *Str. Feath.* ii. p. 442.Karo, Ye (*D.*).]\*102. *M. HÆMACEPHALA* (J. 197).*X. hæmacephala* (L. S. Müller); Marshall, *Mon. Cap.* pl. 42.

Arakan, Tenasserim, Siam, Penang, Malacca, Philippines.

[Rangoon, Tonghoo, Karen nee (*W. R.*); Thayet Myo (*O.*).]*Fam. -PICIDÆ.*Woodpeckers. *Theet-touk* (generic).\*103. *HEMICERCUS CANENTE* (J. 165).*Picus canente*, Lesson, *Cent. Zool.* t. 73.

Arakan, Pegu, Tenasserim. This only differs from the South Indian *H. cordatus* in being constantly larger.

[Karen hills, from 500 to 4000 feet (*W. R.*). Two males are sent by Mr. Ramsay. One has the head uniform deep black; the other with a few buff markings on the feathers of the forehead and crown.]



\*104. *ALOPHONERPES GUTTURALIS* (J. 168).*Picus pulverulentus*, Temminck, P.C. 389; *Picus gutturalis*, Valenciennes.

Arakan, Shan hills, Tenasserim, Malacca, Java. The largest of Asiatic Woodpeckers.

[Arakan and Pegu hills (*O.*); Tonghoo (*L.*). Examples from Cochinchina in no way differ. According to Sundevall (*Consp. Av. Picinarum*, p. 10, no. 23), Temminck's title has priority, and he quotes the year 1825 as the date of publication. But there must be some mistake, for Sundevall refers to the 65th *Livraison* of the *Recueil*, whereas *P. pulverulentus* was described and figured in the 66th. Anyhow, Crotch (*Ibis*, 1868, p. 500) gives 1826 as the year in which both these *Livraisons* were published. Elsewhere (*Ibis*, 1871, p. 164, note) reasons are stated why, while the exact date of Valenciennes' title remains undetermined, preference should be given to the one bestowed by Temminck.]

105. *THRIPONAX CRAWFURDII*.

*Picus crawfordii*, J. E. Gray, Griffith's English edition of Cuvier's "Animal Kingdom," Birds, vol. ii. p. 513, pl. 1; *Hemilophus jeddeni*, Blyth, J. A. S. B. xxxii. p. 75; *T. jerdoni*, Cabanis, Mus. Heine. ii. p. 105.

Upper Pegu.

[Thayet Myo, Tonghoo (*W. R.*); Pahpoon, Kyouknyat (*D.*).]

106. *T. JAVENSIS*.

*P. javensis*, Horsfield; *Picus leucogaster*, Reinwardt, Tem. P. C. 501.

Mergui, Malacca, Sumatra, Java, Borneo, Philippines.

\*107. *CHRYSOCOLAPTES GUTTICRISTATUS* (J. 166 *partim*).

*Picus guttaeristatus*, Tickell ♀; *Indopicus delesserti*, Malherbe, *Mon. Picida*, pl. 64; *Ibis*, 1866, p. 355; 1872, p. 8.

Arakan, Tenasserim, Siam, Malacca.

[Yey-tho, Tonghoo (*W. R.*); Thayet Myo (*F.*); Arakan hills (*O.*). Tickell's title has priority over Malherbe's and Hodgson's titles.]

\*108. *TIGA JAVANENSIS* (J. 184).

*Picus javanensis*, Ljungh; vide Lord Walden in *Ibis*, 1871, p. 170; *Picus tiga*, Horsfield; *Tiga intermedia*, Blyth.

Arakan, Tenasserim, Siam, Java. Common. A smaller race (*T. rufa*, apud Stoliczka) occurring in the Malayan peninsula and Sumatra.\*

[Yey-tho, Rangoon, Tonghoo, Karen nee (*W. R.*); Thayet Myo (*O.*). Malaccan and Javan examples are smaller, otherwise identical.]

\* Vide Stoliczka, in J. A. S. B. xxxix. p. 289.



109. *GEVINUS STRIOLATUS* (J. 171).Pegu, delta of the Irawádi (*Blanford*).

[Tonghoo (*L.*). The Ceylon and Malabar form of this species is considerably smaller than the Sub-Himalayan and Burman. A Ceylon example has the uropygium deep golden orange.]

\*110. *G. VIRIDANUS*.*G. viridanus*, nobis, J. A. S. B. xii. p. 1000.

Arakan, Tenasserim, Pegu, Siam. Barely separable from *G. dimidiatus* of Sumatra and Java, but considered so by Lord Walden.\*

[Tonghoo (*W. R.*). If considered identical with the Javan bird, this Woodpecker must take the title of *vittatus*, Vieillot.]

\*111. *G. OCCIPITALIS* (J. 172).

Arakan, Tenasserim.

[Yey-tho, Tonghoo (*W. R.*); Thayet Myo (*O.*).]

[112. *GEVINUS ERYTHROPYGUS*.

*Gecinus erythropygus*, D. G. Elliot, N. Archiv. 1865, p. 76, pl. iii.; *G. erythropygus*, Wardlaw Ramsay, P. Z. S. April 21, 1874, p. 212, pl. xxxv. (*motu proprio*); *G. nigrigenis*, Hume, P. A. S. B. May, 1874, p. 106.

Foot of Karen hills, also at 600 feet, Tonghoo (*W. R.*); hills north of Pahpoon (*D.*).]

\*113. *CHRYSOPILEGMA FLAVINUCHA* (J. 173).*Chrysophlegma flavinucha* (Gould); B. As. pt. i. pl. 5.

Arakan, Tonghoo.

[Yey-tho, Karen hills, Tonghoo (*W. R.*); Thayet Myo (*O.*); neighbourhood of Pahpoon (*D.*).]

\*114. *C. CHLOROLOPHUS* (J. 174).

Khásias, Arakan, Tenasserim provinces.

[Tonghoo, Karen nee hills, at 3000 feet elevation (*W. R.*); Thayet Myo (*O.*).]

115. *C. MENTALIS*.*Picus mentalis*, Temminck, P.C. 384.

Mergui, Malayan peninsula, Sumatra.

\* Proc. Zool. Soc. 1866, p. 539.



116. *C. PUNICEUS*.*Picus puniceus*, Horsfield, Tem. P.C. 423.

Mergui, Malayan peninsula, Sumatra, Java.

[117. *VENILIA PYRRHOTIS* (J. 176).Tonghoo hills (*W. R.*); Pahpoon (*D.*).]\*118. *GEVINULUS VIRIDIS*.*Gecinulus viridis*, Bl., J. A. S. B. xxxi. p. 341.

Upper Pegu.

[Tonghoo hills, at 2500 feet (*W. R.*); Pahpoon, Kyouknyat, Pahchaun, Ye, Meeta Myo (*D.*).]\*119. *MICROPTERNUS PHAIOCEPS* (J. 178).

Arakan, Tenasserim.

[Rangoon, Tonghoo (*W. R.*); Thayet Myo (*O.*). Malherbe's title of *rufinotus* must be adopted.]\*120. *M. BURMANNICUS*.*M. burmannicus*, A. Hume, P. A. S. B. 1872, p. 71.

Thayet-myo.

[This is nothing but *M. rufinotus*, and has no claim to rank as a distinct species. Mr. Blyth had no opportunity of examining Thayet Myo examples.]\*121. *MEIGLYPTES JUGULARIS*.*Meiglyptes jugularis*, nobis, J. A. S. B. xiv. p. 195.

Arakan, Tenasserim, Siam.

[Arakan and Pegu hills (*O.*). Included by Sundevall (*t. c.* p. 93, no. 4) among his *species dubiæ*, yet an undoubtedly distinct form.]\*122. *M. TRISTIS*.*M. tristis*, Horsfield; Tem. P.C. 197, fig. 1.

Mergui, Pinang, Malacca, Sumatra, Java.

\*123. *DENDROTYPES MACEI* (J. 157).

Arakan, Tenasserim, Malacca.

[Karen hills, at 3000 feet, Karen nee, at 4000 feet elevation (*W. R.*).]\*124. *D. ATRATUS*.*Picus atratus*, nobis, J. A. S. B. xviii. p. 303, xxviii. p. 412.

Tenasserim mountains.

[Karen hills, at 3000 and 4000 feet. Iris, in male, dark brown; bill





horny, mandible whitish; legs, greenish plumbeous (*W. R.*); pine forests north of Pahpoo (*D.*). An old male exhibits a carmine tinge on some of the pectoral feathers.]

125. *D. ANALIS.*

*Picus analis*, Horsfield; *Picus pectoralis*, nobis, J. A. S. B. xv. p. 15.

Tonghoo, where the occurrence of this Javanese species is remarkable.

[Tonghoo (*L.*); Karen nee (*W. R.*); Thayet Myo (*F.*). Identical with Javan examples.]

126. *LIOPIPO MAHRATTENSIS* (J. 160).

*Picus blanfordi*, nobis, J. A. S. B. xxxii. p. 75.

Tonghoo. As compared with specimens from Central India, those from Pegu have more of white on the plumage, but Viscount Walden informs me that in this respect they resemble others from Ceylon.

[Thayet Myo (*F.*); Tonghoo (*W. R.*).]

\*127. *YUNGIPICUS CANICAPILLUS.*

*Picus canicapillus*, nobis, J. A. S. B. xiv. p. 197.

Khásias, Arakan, Tenasserim provinces. Common.

[Tonghoo, Karen nee at 4000-feet (*W. R.*); Thayet Myo (*F.*).]

128. *VIVIA INNOMINATA* (J. 186).

*Picumnus innominatus* (Burton); Gould, B. As. pt. xxii. pl. 13.

Tenasserim mountains.

[Karen hills at 2000 feet (*W. R.*).]

\*129. *SASIA OCHRACEA* (J. 187).

*Sasia ochracea*, Hodgson; Gould, B. As. pt. xxii. pl. 14.

Arakan, Tenasserim.

[Tonghoo hills (*W. R.*).]

[130. *S. ABNORMIS.*

*Picumnus abnormis*, Tem., P.C. 371, fig. 3.

Stated by Mr. Hume (Str. Feath. ii. p. 472) to have been obtained by Mr. Davison near Ye.]

\*131. *LYNX TORQUILLA* (J. 188).

Arakan.

[Karen nee (*W. R.*); Thayet Myo (*O.*).]





## Fam. Cuculidæ.

## Cuckoos.

\*132. *HIEROCOCCYX SPARVERIOIDES* (J. 207).\*

Arakan, Malacca.

[Rangoon, Yey-tho, Karen nee at 4000 feet (*W. R.*); Pahpoon (*D.*).]

133. *H. VARIUS* (J. 205).

This species can hardly but occur, as also *H. nisicolor* (J. 206); but in the Malay countries they would seem to be replaced by *H. hyperythrus*, Gould,† of which *Cuculus fugax*, Horsfield, is the young bird. *H. varius* is common in the Dacca district of Eastern Bengal, and Jerdon gives it from "Burma and Malacca," but I do not remember to have seen a specimen from the eastern side of the Bay of Bengal.

134. *CUCULUS MICROPTERUS* (J. 203) and *C. AFFINIS* (J. 204).

These differ only in size, and have the same note *bhokatáko*, which I often heard in the vicinity of Moulmein during the rainy season, but did not obtain a specimen. Both races occur in Java, and *C. affinis* occurs both in Nipál and the Malayan peninsula. Of necessity both of them must inhabit the Indo-Chinese countries. I have never seen a specimen of intermediate dimensions.

[Mr. Hume (Str. Feath. iii. p. 79) makes the important statement that the above numbers of Jerdon belong respectively to the male and female. If this be so, a hitherto much disputed question is satisfactorily settled.]

135. *C. CANORUS* (J. 199).

A specimen of this bird, in the plumage of immaturity, was shot in my presence, in the garden of the Commissioner, at Moulmein. Mr. Wallace obtained it in Timor.

[Karen nee at 3500 feet (*W. R.*); Prome (*Raikes*).]

136. *C. STRIATUS* (J. 200).

*C. striatus*, Drapiez; Ibis, 1866, p. 359; 1872, p. 12.

The range of this Cuckoo extends from the Himálaya to China and

\* Mr. Hume gives *H. strenuus*, Gould, from Thayet Myo. P. A. S. B. 1872, p. 71. [The Thayet Myo example of the supposed Philippine *H. strenuus*, here alluded to, was nothing but *H. sparverioides*.]

† B. As. pt. viii. pl. 15.





N. Australia. I have seen two Tenasserim examples of it. *C. poliocephalus* can also hardly but occur, as examples from Java differ in no respect from others obtained in the Himálayas, Nilgiris, and mountains of Ceylon.

137. *C. SONNERATII* (J. 202).

Tenasserim provinces, Malayan peninsula and islands. As an Indian bird, I have only seen it from Malabar and Ceylon.\*

[Thayet Myo (*W. R.*).]

\*138. *CACOMANTIS PASSERINUS* (J. 209).

*Cuculus passerinus*, Vahl; *Polyphasia rufiventris*, Jerdon, Ibis, 1872, p. 15.

Arakan, Tenasserim, Siam, Hainan, Pinang. Replaced by a smaller race (*C. threnodes*) at Malacca.

[Thayet Myo, Yey-tho, Tonghoo, Karen nee (*W. R.*). *C. passerinus* is distinct from *C. rufiventris*, the correct title of the species Mr. Blyth refers to. While there is no record of *C. passerinus* ever having been found in Burma, *C. rufiventris* is there very common.]

\*139. *SURNICULUS LUGUBRIS* (J. 210).

Arakan, Tenasserim, Siam, Pinang, Java.

[Tonghoo hills, Yey-tho, Karen nee (*W. R.*). Javan, continental, and Ceylon birds are identical.]

\*140. *CHRYSOCOCYX MACULATUS* (J. 211).

*Cuculus malayanus*, Raffles, apud Gray and Mitchell, Gen. Birds, pl. 117.

Arakan, Tenasserim. Mr. Gould distinguishes a smaller race (*C. schomburgki*) from Siam.†

[Tonghoo (*L.*).]

141. *C. XANTHORHYNCHUS*.

*C. xanthorhynchus*, Horsfield, Zool. Res. in Java, pl. —.

Procured by Helfer, probably in Mergui province, being the supposed new species of *Chalcites* noticed by Jameson (J. A. S. B. viii. p. 243). Malacca, Sumatra, Java, Philippines.

\* According to Lord Walden, the species "*Penthoceryx pravatus* (Horsfield), which inhabits Malacca, Sumatra, Java, and Borneo, is considerably smaller than *P. sonneratii* (Latham) of India and Ceylon." Ibis, 1872, p. 367. Vide admeasurements, loc. cit.

† P. Z. S. 1864, p. 73.



142. *EUDYNAMIS CHINENSIS*.

*Eudynamis chinensis* and *E. malayana*, Cab. Mus. Hein, iv. p. 52; Walden, Ibis, 1870, p. 339.

Nipâl, Tenasserim, Siam.

[Thayet Myo, Rangoon, Tonghoo (*W. R.*). \* *E. malayana* is the correct title. Malaccan individuals are identical.]

\*143. *COCCYSTES COROMANDUS* (J. 213).

*Cuculus coromandus* (Linn.); Gould, B. As. pt. vi. pl. 3.

Arakan, Tenasserim, Siam, Malay countries generally.

[Thayet Myo, Rangoon (*W. R.*).]

144. *C. JACOBINUS* (J. 212).

This common African and Indian species abounds in Upper Pegu; but I have seen it from no other locality eastward of the Bay of Bengal.

[Thayet Myo (*W. R.*).]

145. *PHOENICOPHAËS ERYTHROGNATHUS*.

*Phoenicophaës erythrognaethus*, Hartlaub, Verz. Brem. Samml. p. 95.

Tenasserim provinces, Malayan peninsula, Sumatra, Borneo.

146. *ZANCILOSTOMUS JAVANICUS*.

*Phenicophaus javanicus*, Horsfield, Zool. Res. in Java, pl. —.

Tenasserim provinces, Malayan peninsula, Sumatra, Java.

147. *Z. DIARDI*.

*Melias diardi*, Lesson, Traite, p. 132.

Mergui, Pinang, Malacca, Sumatra.

\*148. *Z. TRISTIS* (J. 215).

Arakan, Tenasserim, Siam, Cambodja, Hainan, Pinang, Malacca. A very common species.

[Rangoon, Tonghoo, Tonghoo hills, Karen nee (*W. R.*); Thayet Myo (*O.*).]

\*149. *CENTROPUS RUFIPENNIS* (J. 217).

Generally diffused.

[Thayet Myo, Karen hills, Tonghoo (*W. R.*). Mr. Hume (Str. Feath. i. p. 454) has separated the race which inhabits the Doon, the neighbourhood of Dacca, and Thayet Myo, under the specific title of *C. intermedius*. These Burman examples bear out Mr. Hume's remarks, and may fairly be considered distinct from the common crow pheasant of Peninsular India.]



[150. *C. EURYCERCUS*.*C. eurycerus*, A. Hay, J. A. S. B. 1845, p. 551.

Introduced by Mr. Hume in his list of birds of the Tenasserim provinces (Str. Feath. ii. p. 473), but without the exact locality being stated. Two distinct species seem to be included by him under the title. The smaller may possibly be *C. rectunguis*.]

\*151. *C. BENGALENSIS* (J. 218).

Also generally diffused.

[Karen nee (*W. R.*).][152. *RHINORTHA CHLOROPHÆA*.*Cuculus chlorophæus*, Raffles, Tr. L. S. xiii. p. 288.Lemyne, Thayet-chaung, near Meeta Myo (*D.*).]*Fam. Trogonidæ.*

## Trogons.

153. *HARPACTES HODGSONI* (J. 116).*Harpactes hodgsoni*; Ibis, 1866, p. 342; Gould, B. As. pt. xvii. pl. 1.

Arakan, Tenasserim.

[Karen nee at 4000 feet (*W. R.*); Thayet Myo (*F.*).]\*154. *H. ORESCIUS*.

*Trogon oreskios*, Tem.; Gould, B. As. pt. xvii. pl. 3; *Mon. Trogonidæ*, pl. 34; Beavan, Ibis, 1869, p. 407; P. Z. S. 1866, p. 538.

Arakan, Tenasserim provinces, Siam, Cambodja, Java.

According to Col. Tickell, *Harpactes hodgsoni* is "common on the hills from 3000 feet upwards. Below that it is replaced by *H. orescius*. It flies in small flocks, and is active and vociferous on the wing, solitary and quiet during the heat of the day, sitting in the shade."

[Karen hills (*W. R.*).]*Fam. Caprimulgidæ.*

## Night-jars.

\*155. *LYNCORNIS CERVINICEPS*.

*Lyncornis cerviniceps*, Gould, *Icones Avium*, pt. ii. pl. 4. *Hgnat byeen*; *Tween-dweng-nghat*.

Generally diffused over the forest-region of British Burma, from Arakan to Mergui. It has recently been procured at Darjeeling. In Upper Martaban





I remarked that on their first appearance, towards evening, these superb Night-jars would seek their food high in the air, descending gradually within gunshot, and finally sweeping about close to the ground, in considerable numbers, as it became too dark to fire at them.

[Tonghoo (*L.*); Pahpoon (*D.*).]

\*156. *CAPRIMULGUS INDICUS* (J. 107).

Generally diffused, extending southward to Malacca and Sumatra.

[157. *C. JOTAKA*.

*C. jotaka*, Tem. & Schlegel, *Fauna Japonica, Aves*, p. 37, pl. 12, 13.

Tonghoo (*L.*).]

\*158. *C. MACROURUS* (J. 110).

Indo-Chinese and Malay countries generally, extending to N. Australia.

[Tonghoo (*W. R.*); Thayet Myo (*F.*). Tonghoo examples very much larger than typical Javan individuals. Wing, 8; tail, 7.]

\*159. *C. MONTICOLUS* (J. 114).

Indo-Chinese countries generally, extending eastward to South China.

[Tonghoo (*W. R.*); Amherst, Yeboo, Pahpoon (*D.*).]

[160. *C. ALBINOTATUS* (J. 109).

Tonghoo (*W. R.*).]

\*161. *C. ASIATICUS* (J. 112).

Arakan, Tenasserim, Siam. One or more species of *Batrachostomus* must needs occur, though as yet overlooked.\* According to Mason, the Burmese call Night-jars *myæ-wot* (earth-crouchers), while the Arakan name for them is *Hynet-byen* (outside-bird).

[Thayet Myo (*W. R.*).]

[162. *BATRACHOSTOMUS HODGSONI* (J. 106).

*Otothrix hodgsoni*, G. R. Gray, *P. Z. S.* 1859, p. 101, pl. 152.

"Karen nee, at 6000 feet. Iris, marbled buff; bill, light madder; legs, light madder, tinged with violet" (*W. R.*).

A male, in grey mottled plumage, and closely resembling the type.

\* Mason, however, gives *Podargus affinis*, Blyth, without mentioning any locality. Probably *Otothrix hodgsoni*, G. R. Gray, if the two really differ.





The other known species of this genus within the Indian region are:—

1. *B. javanensis*, Horsf. = *P. cornutus*, Tem. = *B. stellatus*, Gould. Malacca, Java, Borneo, Sumatra.
2. *B. affinis*, Blyth = *P. parvulus*, Tem. = *B. castaneus*, Hume. Borneo, Malacca, Darjeeling.
3. *B. moniliger*, Layard = *B. punctatus*, Hume. Ceylon, Malabar.
4. *B. stictopterus*, Cab. = *B. stellatus*, Gould, *ap.* Salvadori. Malacca, Borneo. I have some doubts whether this is not a phase of *B. javanensis*. In dimensions the two do not materially differ. The markings are similar, but the colouring is dark rufous brown, and not chestnut. I have never met with examples of this species, if it be one, or of *B. javanensis* in grey speckled plumage. But grey examples of *B. affinis* and *B. moniliger* are as common as rufous individuals.
5. *B. auritus*, Gould. Malacca. In rufous-brown, or in grey plumage, very common; but I have never met with it in chestnut plumage.]

### Tribe CYPSELI.

#### Fam. Cypselidæ.

##### Swifts.

#### \*163. ACANTHYLIS GIGANTEA (J. 96).

*Cypselus giganteus*, Hasselt; P.C. 364.

Arakan, Tenasserim, Andamans, Pinang, Nilgiris, Ceylon.  
[Tonghoo (*L.*). *Chaetura indica*, Hume, is synonymous.]

#### 164. CYPSELUS PACIFICUS.

*Hirundo pacifica*, Latham; *C. vittatus*, Jardine and Selby, *Ill. Orn.* 2nd series, pl. 39;  
*C. australis*, Gould.

Upper Assam, Kachar, Tenasserim provinces, Pinang, China, Australia.  
[Thayet Myo (*O.*).]

#### \*165. C. PALMARUM (J. 102).

*Pyan-hlwa*, Maçon.

The common Indian Palm Swift abounds in the Indo-Chinese countries, where also (though not hitherto detected within the limits of British Burma) must needs also occur the allied *C. infumatus*, Selater (*C. tinus*, Swinhoe; *C. tectorum*, Jerdon),\* which inhabits the Nága and Garo hills, was obtained

\* Ibis, 1871, pl. x.; Gould, B. As. pt. xxiv. pl. 15.



by Mr. Swinhoe in Hainan, and was originally described by Mr. Selater from Borneo. It is somewhat remarkable that *C. subfurcatus*, nobis,\* has not hitherto been observed in the Indo-Chinese countries, though a resident species at Pinang. The allied western species (*C. affinis*), so common in India, is, however included by Mason.

[The title, *C. batassiensis*, J. E. Gray (Cuv. An. King. (Griffith), *Aves*, ii. p. 60, 1829), founded on Latham's *Balassian Swift* (Gen. Hist. vii. p. 329), takes precedence over *C. palmarum*, J. E. Gray (Hardw. Ill. Ind. Zoo. i. pl. 35, fig. 1, 1832).]

[166. *C. INFUMATUS*.

*C. infumatus*, Selater, P. Z. S. 1865, p. 602.

Tonghoo (*W. R.*); very common in Upper Pegu (*O.*); common in Tenasserim (*Hume*).]

167. *COLLOCALIA FUCIPHAGA* (J. 103).

*Hirundo fuciphaga*, Thunberg; Wallace, P. Z. S. 1863, p. 384; *Ibis*, 1863, p. 323; 1866, p. 341; *C. linchi*, apud Ball, J. A. S. B. xli. pt. 2, p. 376.

Arakan, Tenasserim, Andamans.

"The Swiftlets which build the edible nests," remarks Mason, "are so numerous in the limestone caves on the islets and islands of the Tavai coast, that the Government revenue from the birds'-nest farm in 1847 was nearly eleven thousand rupees; but in 1849 it was more than four thousand rupees less. At Mergui they are not so numerous."

[As has been elsewhere shown (*Ibis*, 1874, p. 132), this Swift must take the title of *francica*, Gm. Mr. Wallace was the first author who published the opinion that examples from India, Ceylon, Bourbon, Mauritius, the whole of the Malay islands, the Louisiade Archipelago, New Caledonia, Tahiti, and the Marianne islands, do not specifically differ. That naturalist not considering the variations in size and slight variations in colouration which are to be found occurring sufficient to justify specific separation. Examples (*C. spodiopygia*) from Ovalau and Mango island (Fiji) can hardly be separated.]

168. *C. LINCHI*.

*C. linchi*, Horsfield; Wallace, P. Z. S.; *Voy. "Novara,"* 1863, p. 384, *Vögel*, t. ii. f. 2.

Mergui Archipelago, Nicobars, Java, etc.

[This is the true *Hirundo fuciphaga*, Thunb.]

\* J. A. S. B. xviii. p. 807.



\*169. *MACROPTERYX CORONATUS* (J. 104).*Hirundo coronata*, Tickell; Gould, B. As. pt. xi. pl. 2.Pegu, Siam. Replaced by *M. klecho* in the Malayan peninsula.[Thayet Myo, Tonghoo, Karen nee, at 1700 feet (*W. R.*); Ngabeemah, pine forests north of Kollidoo, Henza Basin (*D.*).]

## Suborder PASSERES.

## Fam. Corvidæ.

Crows, Jays, etc.

\*170. *CORVUS VAILLANTII* (J. 660).*Corvus vaillantii*, Lesson.

Arakan, Tenasserim, Malacca. Generally diffused in pairs throughout the forests.\*

[Pegu (*O.*).]\*171. *C. SPLENDENS* (J. 663).*Kyie-gan*.

At Akyab this Crow abounds, and also (as I was informed by Mr. W. T. Blanford) at Mandell, high up the Irawádi. At Khyouk Phoo, a party of seven individuals made their appearance on the 7th December, 1856, which subsequently stocked the neighbourhood; but to what extent the race may have spread at the present time I am unaware. Elsewhere in Arakan this Crow has still no representative; but across the mountains which divide that province from Pegu, again at Rangoon, Moulmein, Tavoy, and as far South as Mergui, as also in Siam, it is replaced by a wholly black race, quite similar in form and habit, but having a much shriller voice (a sort of *shrieking* caw), if possible still more inharmonious than that of the other. There is just a very faint tinge of ash-colour on the nape and breast, where the common Indian Crow is cinereous; but this must be specially looked for to be remarked. Though abundant about Mergui station, I have not seen it from any locality further south; and I have been assured that it does not occur at Pinang, Malacca, or Singapore. This melanoid race of *C. splendens* is erroneously referred to *C. culminatus* (i.e. *C. vaillantii*) by Mason, as it also

\* For variation of size in this species, cf. W. T. Blanford, J. A. S. B. li. pt. 2, p. 68.



is by the late Sir R. H. Schomburgk.\* Sir A. Phayre, referring to it as the common Crow of the branches of the Irawádi, states that "away from the river, on the hills, there is a Crow of the same size, but not with the same tinge on the neck, being of an uniform black throughout."† As regards the Indian bird, an unknown donor has favoured me with two skins differing remarkably in size, but in no other respect. Length of closed wing 11 in. in the larger specimen, 10 in. in the smaller; of middle tail-feathers, respectively,  $6\frac{1}{2}$  in. and  $5\frac{1}{2}$  in.; tarsus  $1\frac{3}{4}$  in. and  $1\frac{1}{2}$  in. Some Ceylon specimens now (1872) living in the London Zoological Gardens are decidedly smaller, and rather darker coloured than Bengal or Akyab specimens; and I have seen other specimens from Ceylon, which again were darker coloured and approximately melanous ‡

[Rangoon, Tonghoo (*W. R.*). The melanoid variety referred to has recently been separated and named *C. insolens*, Hume (*Str. Feath.* ii. p. 480). The late Mr. G. R. Gray (*H. List*, ii. p. 14) restricted Vieillot's title of *splendens* (erroneously referring it to Temminck) to a supposed Javan and Sumatran species of *Corvus*, and adopted Hodgson's title of *impudicus* for the Indian. The type of *Le Choucas gris du Bengale*, *C. splendens*, Vieillot (*N. D.* viii. p. 441, 1817), came from the Indian continent, and no representative race even of that species is known as existing in either Java or Sumatra, Temminck's statement notwithstanding. *C. impudicus*, Hodgson, must continue, as hitherto, a synonym of *C. splendens*, Vieillot. Another curious variety of this Crow occurs in Tonghoo. Two examples of it are of an isabelline cream colour; the urapygium and abdomen being dark brown. I do not, however, propose to name it as belonging to a distinct species.]

#### Magpie Group.

##### 172. *PICA MEDIA*.

*Pica media*, Blyth, *J. A. S. B.* xiii. p. 393; *P. sericea*, Gould; *P. caudata*, apud J. Anderson, *Exped.*, p. 259.

Bhamo, China, Hainan, and Formosa.

\* *Ibis*, 1864, p. 252.

† *J. A. S. B.* xxii. p. 76, xxiv. p. 479.

‡ Some time ago I received a packet containing two skins of *C. splendens*, coloured as in India. Wing, respectively 11 in. and  $9\frac{1}{2}$  in.; tail,  $6\frac{1}{2}$  and  $5\frac{1}{2}$  in.; beak to forehead 2 in. and  $1\frac{3}{4}$  in. The latter are probably the admeasurements of the Ceylon race.



\*173. *DENDROCITTA RUPA* (J. 674).

Common throughout the Irawádi valley, in Pegu (*Blanford*); also in the vicinity of Moulmein.

[Rangoon, Tonghoo, Yey-tho (*W. R.*); Thayet Myo (*F.*); Tenasserim provinces (*D.*).]

\*174. *D. HIMALAYENSIS* (J. 676).

*D. himalayensis*, nobis, Ibis, 1865, p. 45.

Mountains of Arakan, and probably those of the Indo-Chinese countries generally.

[Tonghoo hills, Karen nee (*W. R.*); north of Pahpoon (*D.*).]

\*175. *CRYPHIRHINA VARIANS*.

*Corvus varians*, Latham; Lev. *Ois d'Afr.* pl. 56; *Phrenotrix temia*, Horsfield, Zool. Res. in Java, pl. —.

Prome, Bassein, common in the neighbourhood of Moulmein, Lower Siam, Java. I have never seen this species from the Malayan peninsula, though it is cited from Malacca by Herr v. Pelzeln, which I strongly suspect to be a mistake.

[Rangoon, Tonghoo, Yey-tho (*W. R.*); Tenasserim provinces (*D.*). The Malaccan habitat is certainly erroneous. This is another peculiar Javan species, which re-appears north of Province Wellesley. It has long since been compared and specifically identified with Javan individuals.]

\*176. *C. CUCULLATA*.

*C. cucullata*, Jerdon, Ibis, 1862, p. 20; Gould, B. As. pt. xv. pl. 3.

Thayet Myo, and the dry country above the British frontier. Not seen in Lower Pegu (*Blanford*).

[Thayet Myo (*W. R.*).]

[177. *TEMNURUS LEUCOPTERUS*.

*Glaucopsis leucopterus*, Tem. P. C. 265.

Meeta Myo (*D.*).]

\*178. *UROCISSA MAGNIROSTRIS*.

*Psilorhinus magnirostris*, nobis; Gould, B. As. pt. xiii. pl. 3.

Mountains of Arakan, Tenasserim, Siam.

[Tonghoo, Karen nee (*W. R.*).]



\*179. *CISSA SINENSIS* (J. 673).*Coracias chinensis*, Bodd.; Gould, B. As. pt. ix. pl. 8.

Arakan, Tenasserim provinces, China (?).

[Tonghoo, Karen hills (*W. R.*); Thayet Myo (*O.*).][180. *GARRULUS LEUCOTIS*.*G. leucotis*, Hume, P. A. S. B. 1874, p. 106.

Tonghoo, Karen nee; very generally distributed both in the hills and in the plains of the Tonghoo province (*W. R.*).]

*Fam. Sturnidæ.*

Starling family.

Subfam. *EULABETINÆ* (True Mainas).\*181. *EULABES INTERMEDIA* (J. 693).*Gracula intermedia*, A. Hay; cf. Stoliczka, J. A. S. B. xxxix. pt. 2, p. 327.

Arakan, Tenasserim provinces, Siam. The common "Hill Maina" of Northern India; that of the Andaman and Nicobar Islands now considered to be different.

[Rangoon, Tonghoo (*W. R.*). Perfectly distinct from *E. javanensis*.]182. *AMPELICEPS CORONATUS*.

*Ampeliceps coronatus*, nobis, J. A. S. B. xi. p. 194, xv. p. 32; Gray and Mitchell, Gen. Birds, pl. 81.

Tonghoo, Yé, Mergui, Cochin China.

[Tonghoo (*L.*); South of Moulmein (*D.*).]Subfam. *STURNINÆ* (Starlings, etc.).\*183. *ACRIDOTHERES TRISTIS* (J. 684).*Za-yet-mouk*.

Arakan, Pegu, Tenasserim.

[Rangoon (*W. R.*); Thayet Myo (*O.*).]\*184. *A. GINGINIANUS* (J. 685).

Tenasserim provinces. Though common in Upper India, as remarked by Jerdon, "it certainly does not occur in Southern India, notwithstanding its specific name, taken from Gingi, south of Madras."





\*185. *A. FUSCUS* (J. 686 *partim*\*).

Arakan, Tenasserim, Pinang, Malacca, Hainan.

[Rangoon, Tonghoo (*W. R.*).]

[186. *A. SIAMENSIS*.

*A. siamensis*, Swinhoe, P. Z. S. 1863, p. 303.

"Karen nee, at 3000 feet. Iris, pale chocolate; bill, orange-yellow; legs, dusky yellow" (*W. R.*).]

\*187. *STURNOPASTOR CONTRA* (J. 683).

*Sturnopastor contra*, var. *superciliaris*, nobis, J. A. S. B. xxxii. p. 77.

Khásias, Thayet Myo, Tavoy, Siam.

About Tavoy it is particularly abundant, and, as Mason remarks, "is often seen perched on the back of the Buffalo, gathering insects."

[Tonghoo (*W. R.*).]

188. *S. NIGRICOLLIS*.

*Gracula nigricollis*, Paykull, Act. Holm. xxviii. pl. 9; *Pastor temporalis*, Tem.

Bhamo, Lower Siam, South China.

189. *STURNIA BURMANNICA*.

*Sturnia burmannica*, Jerdon, Ibis, 1862, p. 21; *Pastor peguanus*, Lesson, (?) the young (?).

Thayet Myo and Ava; more common above the British frontier than below it (*Blanford*).

[Tonghoo, Karen nee, Thayet Myo (*W. R.*). A sordid tawney-white albino variety of this species is among the Thayet Myo examples.]

\*190. *S. PAGODARUM* (J. 687).

Arakan.

\*191. *S. MALABARICA* (J. 688).

Arakan, Pegu, Tenasserim.

[This species does not appear to inhabit Upper Pegu, being replaced by the following.]

\* The true *A. mahrattensis* (Sykes), of South India, has been received at the London Zoological Gardens. It has the bill wholly yellow, white irides; a less developed frontal crest, and more of white tipping the middle tail-feathers. *A. leucocephalus*, a very distinct species, from Cochin China, is described in the Ibis, 1870, p. 185. Another allied species from Siam is distinguished by Mr. Swinhoe as *A. siamensis* (P. Z. S. 1863, p. 303).



192. *S. NEMORICOLA*.*S. nemoricola*, Jerdon, Ibis, 1862, p. 22.

Thayet Myo.

[Rangoon, Tonghoo (*W. R.*). *T. leucopterus*, Hume (Str. Feath. ii. p. 480, note) appears to be synonymous.]193. *S. SINENSIS*.*Oriolus sinensis*, Gmelin; Pl. Enl. 617; *Pastor elegans*, Lesson, Bélanger, Voyage, pl. 6.Pegu (*Lesson*); China.

[That this species winters in Pegu is suggested by Mr. Swinhoe (P.Z.S. 1871, p. 384), but the fact has yet to be established.]

194. *CALORNIS DAURICA*.*Turdus dauricus* et *Gracula sturnina*, Gmelin; *Pastor malayensis*, Eyton; Pl. Enl. 627, fig. 2.

Mergui, Malacca, Dauria.

[This bird can hardly be placed in the genus *Calornis*. It is more nearly allied to the members of *Sturnia*. Its oldest specific title is *sturnina*, Pallas. It is difficult to decide what species is meant to be depicted in Pl. Enl. 627, fig. 2.]195. *C. AFFINIS*.*O. affinis*, A. Hay, J. A. S. B. xv. pp. 36, 369.

Tippera, Arakan, Nicobar Islands.

196. *C. CHALYBEA*.*Turdus chalybeus* et *T. strigatus*, Horsfield; *T. insidiator*, Raffles, Tem. P.C. 199. figs. 1, 2.

Mergui, Malacca, Sumatra, Java.

[If the Mergui *Calornis* belongs to the Malaccan and Sumatran species, it must take the title of *insidiator*, Raffles, until it has been shown that the Javan *Calornis* belongs to the same species.][197. *SARAGLOSSA SPILOPTERA* (J. 691).Karen hills at 2000 feet, Tonghoo (*W. R.*).]*Fam. Ploceidæ.*

## Weaver-Birds.

198. *PLOCEUS JAVANENSIS*.*Loxia javanensis*, Lesson, Traité, p. 446.

Pegu, Siam, Java, Lombok. Observed by myself in Rangoon station.

[Rangoon, Tonghoo (*W. R.*); Thayet Myo (*O.*).]



\*199. *P. PHILIPPINUS* (J. 694).*P. baya*, nobis; cf. W. T. Blanford, J. A. S. B. xli. pt. 2, p. 167. *Tsa-ghaung-kwet*.

Arakan, Lower Pegu, Malacca, Sumatra, not Philippines. Attaches its pensile nests to the projecting thatch of dwelling-houses in Rangoon, as duly noticed by Jerdon.

[Rangoon, Tonghoo (*W. R.*); Thayet Myo (*O.*).]\*200. *P. MANYAR* (J. 695).

Arakan, Thayet Myo, Siam, Java.

201. *P. BENGALENSIS* (J. 696).

Thayet Myo, Ava.

*Fam. Astrildidæ.*

Waxbills, Amadavats, etc.

202. *PADDA ORYZIVORA*.*Loxia oryzivora*, Lin.; Edwards, pl. 41.

The well-known "Java Sparrow" of British dealers in birds, which is extensively diffused over the Malay countries, was procured in Mergui province by Major Berdmore. Mr. Swinhoe notices it from Amoy, Hong-kong, and Shanghai; but in the vicinity of those emporia it has probably escaped from captivity in the first instance, as it likewise has in that of Madras, in Madagascar, Zanzibar island, the Seychelles, St. Helena, Celebes, and the Philippines.

\*203. *MUNIA RUBRINIGRA* (J. 698).

Arakan, Pegu, Tenasserim, South-west China. Common. Bornean specimens are similar to Indian and Burmese, having the black of the abdominal region and lower tail-coverts well developed; but this black is much reduced in quantity, and sometimes nearly obsolete, in examples from Malacca and Sumatra. In the race inhabiting Celebes (*M. brunneiceps*, Walden), the black beneath is well developed, while that on the head and neck is much embrowned. The race with white underparts, having the black abdominal patch and lower tail-coverts (Edwards, pl. 355), has never been observed eastward of the Bay of Bengal, but occurs rarely in Lower Bengal, and prevalently (if not wholly) in South India and Ceylon. *M. formosana*, Swinhoe,\* is yet another of these very slightly differing races, for which names are barely admissible.

[Tonghoo (*W. R.*).]

\* Ibis, 1865, p. 356.



\*204. *M. PUNCTULARIA* (J. 699).

Arakan, Pegu, Tenasserim, Siam. The true Indian race, as distinguished from the kindred *M. nisoria* (Tem.), which inhabits the Malayan peninsula, and has ash-coloured upper tail-coverts.

[Rangoon, Tonghoo (*W. R.*). The Burman spotted *Munia*, as represented by Mr. Ramsay's examples, belongs to *M. sub-undulata*, Godwin-Austen (J. A. S. B. xliii. p. 370, May 6, 1874), *M. superstriata*, Hume (Str. Feath. ii. p. 481, note, Oct. 1874), being a synonym.]

\*205. *M. ACUTICAUDA* (J. 702).

Arakan, Tenasserim, Siam, Malacca, Sumatra, China, Formosa. This species is the *Fringilla muscardina* of the Leyden Museum, a systematic name which is adopted for it by Mr. Gould.\* In Japan it is extensively bred, white, partially white, and of pale colouring.

[Tonghoo hills (*W. R.*); Thayet Myo (*O.*). I cannot find that Mr. Gould employed the title of *muscardina* in any part of the Z. S. Proceedings of 1859.]

\*206. *M. LEUCONOTA* (J. 701).

*Tau-tsa*, "Forest Sparrow."

Arakan. Of general diffusion.

207. *ASTRILDA AMANDAVA* (J. 704).

Mason includes this species (the common Speckled Waxbill, Amadavat, or *Lál Munia* of India) without remark; and Sir R. H. Schomburgk notices its occurrence in Siam, as also Mr. Gould (from specimens sent by Schomburgk).† "Many are brought to Bangkok for sale. They frequent the rice-fields and pastures, and go in flocks." I do not remember having seen Burmese specimens; but Jerdon notices that the range of the species extends to Assam and Burma, which Mr. W. T. Blanford assures me is the fact.

*Fam. Fringillidæ.*

## True Finches.

## Subfam. PASSERINÆ (Sparrows).

\*208. *PASSER INDICUS* (J. 706).

*P. domesticus*, var. (F), Ibis, 1867, p. 41. *Ein-tsa* (House Sparrow).

Not uncommon at Akyab, but rare to the southward, in the jungle-clad provinces. Common, together with *P. montanus*, at Thayet Myo. Nubian specimens are undistinguishable.

\* P. Z. S. 1859, p. 150.

† P. Z. S. 1859, p. 150.



\*209. *P. MONTANUS* (J. 710).

The common house Sparrow everywhere to the eastward of the Bay of Bengal, its range extending southward to the Malay countries, and eastward to China and Japan, Formosa, and the Philippines.

\*210. *P. ASSIMILIS*.

*P. assimilis*, Walden, An. M. N. H. (4), v. p. 218.

Tonghoo.

\*211. *P. FLAVIOLUS*.

*P. flaveolus*, nobis, J. A. S. B. xxxi. p. 344. *Passer jugiferus*, Tem., Bonap. Consp. Av. i. p. 508.

Arakan, Upper Pegu; "abundant in the bushes near Thayet Myo; also common further up the Irawádi" (*W. H. Blanford*). Doubtful as an inhabitant of the Philippines, as alleged of *P. jugiferus*, which I identified with the present species in the Royal Museum of Natural History at Leyden. According to Mason, this species "is found throughout the country," but he shows that he did not recognize *P. montanus* to be the common Sparrow of the country!

[ "Iris, in ♀, brown; bill above, pinkish brown, below somewhat paler; legs brownish. Karen nee" (*W. R.*). One example, a female, has the mandibles crossed as in *Loxia*, the maxilla to the left, the mandible to the right.]

Subfam. FRINGILLINÆ (Typical Finches).

\*212. *CARPODACUS ERYTHRINUS* (J. 738).

Arakan.

[Tonghoo (*W. R.*).]

Subfam. EMBERIZINÆ (Buntings).

\*213. *EUSPIZA AUREOLA* (J. 723).

Arakan, Pegu, Tenasserim, China. Occurs in large flocks in the interior, which migrate northward to breed.

[Tonghoo (*L.*). *Mirafra flavicollis*, McClell., as long since stated by Horsfield and Moore, is the female. *E. flavogularis*, Blyth, is also synonymous. In the H. List, No. 7679, McClelland's title is made to represent a distinct species, and that of Mr. Blyth is treated as a synonym of *M. flavicollis*.]



214. *EMBERIZA RUTILA*.*Emberiza rutila*, Pallas; Tem. and Schl., Fauna Japonica, Aves, tab. 56B.

A single specimen procured by Mr. W. H. Blanford, near Bassein.  
Another since obtained at Sikhim.

[Tonghoo, Karen nee, Tsankoo hills (*W. R.*); neighbourhood of Pah-  
poon (*D.*).]

[215. *E. FUCATA* (J. 719).

Tonghoo, Thayet Myo, in winter (*O.*).]

[216. *E. PUSILLA* (J. 720).

Karen nee, at 5500 feet (*W. R.*).]

\*217. *MELOPHUS MELANICTERUS* (J. 724).

Arakan, Pegu, Siam, South China.

[Karen nee (*W. R.*).]

*Fam. Alaudidæ.*

## Larks.

\*218. *ALAUDA GULGULA* (J. 767).

Sent from Arakan, where probably not common. It is likely to be so  
in Upper Burma.

219. *ALAUDULA RAYTAL* (J. 762).

"Abundant on the banks of the Irawádi, in Upper Burma, frequenting  
the sand-dunes, to the colour of which its own plumage closely approximates.  
During the height of the flood of the Irawádi, I observed it feeding on the  
roads and plains in the station of Thayet Myo in small parties" (*Jerdon*).

\*220. *MIRAFRA ASSAMICA* (J. 754).

Arakan.

221. *M. AFFINIS* (J. 755).

Common at Thayet Myo (*W. H. Blanford*).

[*M. microptera*, Hume (*Str. Feath. i. p. 483*), is synonymous.]

*Fam. Motacillidæ.*

## Wagtails and Pipits.

\*222. *CORYDALLA RICHARDI* (J. 599).

Arakan.

[Tonghoo, Karen nee (*W. R.*); Pahpoon, Tavoy, Moulmein (*D.*).]



\*223. *C. RUFULA* (J. 600).

Arakan, Tenasserim.

[Rangoon, Tonghoo (*W. R.*).]\*224. *PIPASTES MACULATUS* (J. 596).*Anthus maculatus*, Hodgs.; Gould, B. As. pt. xvii. pl. 11; Fauna Japonica, Aves, pl. xxiii.Arakan, Tenasserim. *Anthus agilis*, Sykes, is true *P. trivialis*.

[Karen nee hills, from 2000 to 5200 feet elevation (*W. R.*). Some eminent ornithologists decline to admit the specific distinction of *A. agilis*, *A. maculatus*, and the common European Tree Pipit. In the H. List, No. 3640, L. S. Müller's title of *plumatus* is adopted for the European bird. But as Linnæus published the twelfth edition of the Systema ten years before L. S. Müller bestowed the title cited, it is more in accordance with accepted practice to prefer the Linnæan title.]

\*225. *ANTHUS ROSACEUS* (J. 605).

Arakan.

[226. *A. CERVINUS*.*Motacilla cervina*, Pallas, Zoogr. Rosso-As. i. p. 511.

Examples obtained by Mr. Davison in Tenasserim are thus identified by Mr. Hume.]

\*227. *BUDYTES VIRIDIS* (J. 593).*Motacilla cinereicapilla*, Savi, N. Giorn. d. Lett. p. 190.

Arakan, Tenasserim. Bengal and Egyptian specimens quite similar.

[Rangoon, Tonghoo, Karen nee at 3000 feet elevation (*W. R.*).][228. *B. CALCARATUS* (J. 594).

A single immature example obtained at Pahpoon by Mr. Davison is thus identified by Mr. Hume.]

\*229. *LIMONIDROMUS INDICUS* (J. 595).*Motacilla indica*, Gm.; Gould, B. As. pt. xiv. pl. 13.

Arakan, Tenasserim, Malacca, China.

[Thayet Myo (*F.*).]\*230. *MOTACILLA LUZONENSIS* (J. 590).

Arakan, Tenasserim.

[Tonghoo (*W. R.*). The black-backed, white-faced species, is referred to under the above title. But strictly Sonnerat described the grey-backed





bird. While Scopoli in his diagnosis, taken from Sonnerat, misquoted the description, and converted the word "grey" into black." The members of this section of the genus which inhabit Luzon have not hitherto been examined, and it therefore remains quite uncertain from what species Sonnerat described. It is not improbable that he did so from an Indian example of *M. dukhunensis*.]

[231. *M. DUHUNENSIS* (J. 591).

Tonghoo, Karen nee (*W. R.*); Pahpoon (*D.*).]

\*232. *M. BOARULA* (J. 592).

Arakan, Tenasserim, Malacca.

[Rangoon (*W. R.*). Whether or not specifically distinct from *M. sulphurea* of Europe, this bird must take the title of *melanope*, Pallas.]

#### *Fam. Henicuridæ.*

##### *Henicures.*

\*233. *HENICURUS GUTTATUS* (J. 584, *partim*).

*Enicurus guttatus*, Gould, P. Z. S. 1865, p. 664; B. As. pt. xviii. pl. 11.

East Himalaya, Khásias, Arakan.

\*234. *H. IMMACULATUS* (J. 585).

Khásias, Arakan, Tenasserim.

[Thayet Myo (*O.*).]

\*235. *H. SCHISTACEUS* (J. 586).

Arakan, where much less common than the preceding race; Tenasserim, China.

[Karen hills (*W. R.*).]

[236. *H. LESCHENAULTI*.

*Turdus leschenaulti*, Vieill. N. D. 20, p. 269.

This Javan and Foochow bird is stated by Mr. Hume to have been obtained in the neighbourhood of Pahpoon and at Meeta Myo. If the identification is correct, an interesting fact. It may perhaps be *H. frontalis*.]

#### *Fam. Brachyuridæ.*

##### *Pittas.*

\*237. *HYDROORNIS NIPALENSIS* (J. 344).

*Hydroornis nipalensis*, Hodgson; Gould, B. As. pt. i. pl. 2.

Arakan, Tenasserim.



[238. *H. OATESI*.*H. oatesi*, Hume, Str. Feath. i. p. 477.

"Karen nee, from 2500 to 4000 feet. Iris (male not quite mature), brown; bill, pale brown; legs, light fleshy pink. Iris (in adult female), brown; bill, dark vinous brown; legs, light fleshy pink" (*W. R.*).]

\*239. *BRACHYURUS CYANEUS*.

*Pitta cyanea*, nobis, J. A. S. B. xii. p. 1008, xvi. p. 153; Gray and Mitchell, Gen. Birds, pl. 55; Gould, B. As. pt. i. pl. 2a; D. G. Elliot, Mon. Brachyuridæ, pl. xiii. *Myai-gnung*. Arakan, Martaban; Tenasserim (*Helper*).

[Karen hills, at 2000 feet. Iris, hair brown; bill, black; legs, fleshy (*W. R.*).]

\*240. *B. MOLUCCENSIS*.

*Turdus moluccensis*, P. L. S. Müller; Elliot, Ibis, 1870, p. 413; Mon. Brachyuridæ, pl. iv.; *Pitta cyanoptera*, Temminck, P.C. 218.

Arakan, Tenasserim, Siam, Malacca, Sumatra, Java, Borneo, South China (Amoy). One specimen, received from Arakan, has the bill fully as large as in *B. megarhynchus* (Schlegel), from the Isle of Banka.\*

[Rangoon (*W. R.*); Thayet Myo (*D.*). There is no evidence in favour of the Javan habitat attributed to this *Pitta* by Temminck. The size of the bill varies considerably.]

[241. *B. MEGARHYNCHUS*.

*Pitta megarhyncha*, Schlegel, Vog. Nederl. Ind. *Pitta*, p. 32, no. 8, pl. 4. fig. 2.

A well-marked species, hitherto known as being peculiar to the island of Banka, but stated by Mr. Hume (Str. Feath. ii. p. 475) to occur at Tavoy and Amherst in the months of May, June, and July.]

\*242. *B. CUCULLATUS* (J. 346).

Nipāl, Khásias, Arakan, Malacca.

[Rangoon (*W. R.*); Thayet Myo (*F.*); Amherst (*D.*). Malaccan individuals are identical with Himalayan and Burman examples.]

*Fam. Turdidæ.*

## Thrushes.

## Subfam. TURDINÆ.

\*243. *MYIOPHONUS TEMMINCKII* (J. 343).

Khásias, Arakan, Tenasserim.

[Karen hills (*W. R.*). *M. eugenei*, Hume (Str. Feath, i. p. 475) is synonymous. *M. temminckii* extends to Siam.]

\* Ibis, 1870, pl. xii.



[244. *BRACHYPTERYX CRURALIS* (J. 338).

Karen nee, 5000 feet (*W. R.*).]

[245. *PHOEPHYGA SQUAMATA* (J. 329).

Karen nee, at 4000 feet (*W. R.*).]

\*246. *PETROCOSYPHUS CYANEUS* (J. 351).

Arakan, Tenasserim. Generally, but not always, with more or less of ferrugineous colouring on the abdominal region, as in specimens from the East Himalaya. "In Burma," remarks Colonel M'Master, "this is the tamest and most confiding bird I have ever seen; it not only frequently enters the verandahs, but the inner rooms of houses, and is almost startling with its noiseless and uncanny familiarity. Whilst at Tonghoo, I had, every season, one or two of them about my house, so fearless, that they might almost have been handled. I saw one, in my verandah at Rangoon, kill and swallow a large scorpion."\*

[Karen hills, from 2000 to 4000 feet (*W. R.*).]

247. *MONTICOLA SAXATILIS*.

*Turdus saxatilis*, L.; Pl. Enl. 562.

"Upper Burma, on the banks of the river near Ava."† "Summers on the Pekin mountains" (*Laird*).

\*248. *OROCOETUS CINCLORHYNCHUS* (J. 353).

Arakan.

\*249. *GEOCICHLA CITRINA* (J. 355).

Arakan.

[Tonghoo, Karen nee (*W. R.*); Thayet Myo (*O.*); neighbourhood of Ye and Amherst (*D.*).]

\*250. *TURDUS OBSCURUS*.

*Turdus obscurus*, Gmelin; *T. pallens*, Pallas; *T. rufulus*, Drapiez; *T. modestus*, Eyton;‡ Fauna Japonica, Aves, pl. xviii. *Myai-lu-hgnet*.

Khásias, Arakan, Andamans, Malacca, Java, Borneo, China, and North-East Asia, according to season.

[251. *T. PALLIDUS*.

*T. pallidus*, Gm. S. N. i. p. 815.

Karen nee, at 5000 feet in January (*W. R.*). Has also been received by Major Godwin-Austen from N. Cachar.]

\* J. A. S. B. xl. pt. 2, p. 211.

† vide Blanford, Ibis, 1870, p. 466.

‡ Not *T. javanicus*, Horsfield, which is the same as *T. fumidus*, S. Müller.



[252. *T. SIBERICUS*.*T. sibericus*, Pallas, Reise, Russ. Reichs, iii. p. 694, no. 10.

Karen nee, March 1, at 2500 feet. Iris (in female), rich brown; bill, black, slightly yellow at gape; leg, brownish yellow (*W. R.*).]

\*253. *ZOOTHERA MARGINATA*.*Zoothera marginata*, nobis, J. A. S. B. xvi. p. 141.\*

Khásias, Arakan.

[“Karen nee, from 1500 to 3000 feet. Iris (♂, ♀), dark brown; maxilla, dark brown, almost black; basal half of mandible, albescent; legs, brown with a tinge of pink; orbital skin, purplish” (*W. R.*).]

[254. *OREOCINCLA MOLLISSIMA* (J. 370).Karen nee, at 5000 feet (*W. R.*).][255. *O. DAUMA* (J. 371).Thayet Myo (*Hume*).]

Subfam. —

\*256. *ANTHOCINCLA PHAYREI*.*Anthocincla phayrei*, nobis, J. A. S. B. xxxi. p. 343.One specimen procured in Tonghoo. [Pahpoon (*D.*).]

Subfam. SAXICOLINÆ (Wheatears, Robins, etc.).

\*257. *CITTOCINCLA MACROURA* (J. 476).

Arakan, Tenasserim, Malacca, Sumatra, Java. The Hainan race is smaller, according to Mr. Swinhoe.

[Rangoon, Tonghoo, Karen nee, at 1500 feet (*W. R.*).]\*258. *COPSYCHUS SAULARIS* (J. 475).*Gracula saularis*, Lin.; Gould, B. As. pt. xv. pl. 5. *Tha-beik-lway*.

Arakan, Pegu, Tenasserim, Siam, South China.

[Rangoon, Tonghoo, Karen nee (*W. R.*).]259. *MYIOMELA LEUCURA* (J. 477).

Procured by Col. Tickell upon Moulè-it mountain, at an elevation of 5500 feet, being probably the same species as was obtained by Bélanger in Pegu, in which case, the kindred Javanese race (*Brachypteryx albifrons*,

\* *Z. monticola*, apud Godwin-Austen, J. A. S. B. xli. pt. ii. p. 142.



Boie)\* is figured for it by M. Lesson, by the name *Notodela diana*, in the supposition of its being a more brightly coloured specimen of the same bird; the two species being very nearly allied. *M. leucura* has also been obtained in the Khásias.

[Karen nee (*W. R.*). In his text Lesson also describes the Javan bird, and there is nothing to show that he referred to any other species. The genus *Notodela*, of which *Lanius diana*, Lesson, is the type, must, therefore, merge in *Brachypteryx*.]

\*260. *RHYACORNIS FULIGINOSA* (J. 505).

Arakan, Thayet Myo, China.†

[261. *RUTICILLA AUROREA* (J. 500).

Thayet Myo (*F.*).]

\*262. *CHÆMARRHORNIS LEUCOCEPHALUS* (J. 506).

Arakan.

\*263. *CYANECULA SUECICA* (J. 514).

Arakan.

\*264. *CALLIOPE CAMTSCHATKENSIS* (J. 512).

Arakan.

[Karen nee (*W. R.*); Thayet Myo (*F.*); Pahpoon (*D.*).]

[265. *LARVIVORA CYANE*.

*Motacilla cyane*, Pallas, Reise Russ. Reichs, iii. p. 697, no. 18.

Pahpoon (*D.*).]

266. *BRACHYPTERYX* ——— (?).

From Zwagaben mountain, described by Lieut. Beavan.‡

267. *OREICOLA JERDONI* (J. 487).

*Rhodophila melanoleuca*, Jerd.; Gould, B. As. pt. xviii. pl. 11.

“Obtained only once, in long elephant-grass, in the northern portion of the Bassein district” (*W. H. Blanford*).

\*268. *PRATINCOLA FERREA* (J. 486).

Arakan, Pegu, Tenasserim, South China.

[Tonghoo, Tonghoo hills, Karen nee, at elevations of from 2500 to 4000 feet (*W. R.*).]

\* Bonap. Consp. Av. i. p. 257.

† *R. aurorea* has been received both from the Khásias and the Malayan peninsula.

‡ Ibis, 1870, p. 321.





\*269. *P. CAPRATA* (J. 481).

*Lay-khya.*

Arakan, Tenasserim, Java, Celebes, Lombock, Floris, Philippines, Timor.  
[Tonghoo, Yey-tho, Karen nee, at 3500 feet (*W. R.*); Thayet Myo  
(*O.*).]

\*270. *P. INDICA* (J. 483).

*P. indica*, nobis; Gould, B. As. pt. xv. pl. 12.

Arakan, Pegu, Tenasserim.

[Rangoon, Tonghoo (*W. R.*). It has been shown most conclusively by Mr. Dresser (B. Eur. Dec. 1873) that the Asiatic Stonechat cannot be specifically separated from the European. Mr. Blyth's title must therefore give way to that of *P. rubicola* (Lin.).]

271. *P. LEUCURA* (J. 484).

*P. leucura*, nobis; Gould, B. As. pt. xviii. pl. 12.

"Banks of the Irawádi, near Thayet Myo, and throughout Upper Burma. Common, and a constant resident" (*W. H. Blanford*).\*

[Tonghoo (*L.*).]

#### Fam. Muscicapidæ.

Chat-flycatchers,†

272. *NILTAVA GRANDIS* (J. 316).

*Chaitaris grandis*, nobis; Gould, B. As. pt. ii. pl. 4.

Tenasserim mountains.

\*273. *N. SUNDARA* (J. 314).

*N. sundara*, Hodgson; Gould, B. As. pt. ii. pl. 5.

Mountains of Arakan and Tenasserim.

[Karen nee, at 4000 feet (*W. R.*).]

[274. *N. MACGRIGORÆ* (315).

*Phanicura macgrigoræ*, Burton; Gould, B. As. pt. ii. pl. 6; *Niltava vicida*, Hume, Str. Feath. ii. p. 475.

[Karen nee, at 3000 feet (*W. R.*); three days south of Pahchaun (*D.*).]

\* Query *Saxicola hemprichii* (?), Ehbrenberg, Symb. Phys., fol. aa. [The characters which distinguish *P. leucura* from *P. hemprichii* will be found stated by Mr. Dresser, B. Eur., sub *P. rubicola*.]

† These Chat-flycatchers, with mottled nestling plumage, intergrade much with the preceding subfamily.



Karen examples identical with Himalayan, etc. The Tenasserim bird has been separated under the title cited, from being "altogether brighter than the Himalayan species." No other character (?) is mentioned.]

\*275. *CYORNIS RUBECULOIDES* (J. 304).

Arakan, Pegu, Tenasserim provinces.

[Rangoon, Tonghoo hills, Karen nee, from 600 to 2000 feet (*W. R.*). Many of my Burman examples, and also some from Ceylon, have the dark blue of the throat divided by the rufous colouring of the breast running up almost to the chin. Examples obtained in the neighbourhood of Pahpoon and Ye are identified by Mr. Hume as belonging to *Cyornis elegans* (Tem.); an identification, judging by his remarks (*Str. Feath.* iii. p. 104, *sub C. rubeculoides*), which requires confirmation. *Cf. Walden, Ibis, 1872, p. 373.*]

[276. *C. TICKELLI* (J. 305, 306).

*C. tickelli*, Blyth, J. A. S. B. 1842, p. 491.

Karen nee (*W. R.*).]

\*277. *SIPHIA STROPHIATA* (J. 319).

Arakan, Tenasserim.

[278. *S. ERYTHACA* (J. 322).

*S. erythaca*, Blyth & Jerdon, P. Z. S. 1861, p. 201.

Karen hills, at 4000 feet (*W. R.*); pine forests north of Pahpoon (*D.*).]

\*279. *ANTHITES MONILIGER* (J. 317).

Arakan, Tenasserim.

[Karen nee, at 5000 feet (*W. R.*).]

\*280. *ERYTHROSTERNA MACULATA* (J. 326).

Arakan, Tenasserim, Java.

[Karen nee, at from 3000 to 5000 feet (*W. R.*).]

\*281. *E. LEUCURA* (J. 323).

Arakan, Pegu, Tenasserim, Hainan. Very common about Akyab in the cold season; obtained also at Bassein.

[Rangoon, Karen hills (*W. R.*).]

282. *E. ACORNAUS*? (J. 325).

Zwagaben.\*

[Karen nee, at 2500 feet (*W. R.*). *E. sordida*, Godwin-Austen, is the female of some species of *Xanthopygia*, perhaps of *X. narcissina*, but from which the type slightly differs.]

\* Beavan, *Ibis*, 1870, p. 320.





\*283. *EUMYIAS MELANOPS* (J. 301).

Arakan, Tenasserim.

[Karen nee, at from 700 to 5000 feet; frequents rocky hills (*W. R.*).]

\*284. *BUTALIS LATIROSTRIS* (J. 297).

Arakan, Malacca, Sumatra, China.

[Tonghoo (*W. R.*); Pabyouk and Meeta Myo (*D.*).]

\*285. *B. SIBIRICUS* (J. 296).

*Muscicapa sibirica*, Gmelin; cf. W. E. Brooks, J. A. S. B. xli. pt. 2, p. 75.

Arakan.

[Tonghoo hills, Karen hills at 700 feet, in December, a young bird (*W. R.*).]

286. *B. FERRUGINEUS* (J. 299).

Thayet Myo, Hainan, South China.

### Fam. Sylviidæ.

#### Warblers.

\*287. *ARUNDINAX AËDON* (J. 518).

Arakan, Tenasserim, China.

[Tonghoo (*W. R.*).]

\*288. *ACROCEPHALUS BRUNNESCENS* (J. 515).

Arakan.

[Hemprich & Ehrenberg's specific title, *stentorea*, has precedence.]

\*289. *A. DUMETORUM* (J. 516).

Arakan.

[290. *A. BISTRIGICEPS*.

*A. bistrigiceps*, Swinh., Ibis, 1860 (January 1st), p. 51. *Salicaria maackii*, Schrenck, Amur Lande, i. pt. ii. p. 370, pl. 12, fig. 4-6 (June, 1860).

Tavoy (*D.*).]

[291. *NEORNIS FLAVOLIVACEA* (J. 552).

A specimen obtained by Mr. Oates in Upper Pegu is doubtfully thus identified by Mr. Hume (Str. Feath. iii. p. 139).]



[292. *N. ASSIMILIS*.

*Horornis assimilis*, Hodgs. Cat. B. of Nipaul; Brit. Mus. 2nd ed. p. 143; Blyth, Ibis, 1867, pp. 21, 22; Godwin-Austen, J. A. S. B. 1874, p. 167.

Karen nee (*W. R.*). In all respects identical with Shillong, Naga hills, Assam, and Darjeeling examples, excepting that the entire under-surface is more decidedly tinged with pale sordid yellow. *N. assimilis* can be readily distinguished from *N. flavolivacea*, by its shorter wing and tail, weaker and much shorter bill, and by having the under shoulder-coverts pure sulphur-yellow.]

\*293. *PHYLLOPNEUSTE FUSCATUS* (J. 555).

*Horornis fulviventris*, Hodgson, P. Z. S. 1845, p. 31.

Arakan, China.

[Yattoun (*O.*); Ye-boo, Pahpoon (*D.*).]

\*294. *P. BRUNNEUS*.

*P. brunneus*, Blyth, J. A. S. B. xiv. p. 591; *P. maackii*, Schrenck; cf. Ibis, 1871, p. 109.

Arakan.

\*295. *P. MAGNIROSTRIS* (J. 556).

*P. borealis*, Blasius, Naumania, 1858, p. 313; Ibis, 1871, p. 110.

Arakan, China.

[Mr. Hume (Str. Feath. ii. p. 478) includes *P. borealis* as a Tenasserim species, but omits *P. magnirostris*.]

\*296. *P. VIRIDANUS* (J. 560).

*P. schwartzi*, Radde, Reisen, ii. p. 260, pl. ix. f. 1, a, b, c.

Arakan.

[Neighbourhood of Pahpoon (*D.*).]

[297. *P. LUGUBRIS* (J. 558).

Pahpoon (*D.*).]

[298. *P. BROOKSI*.

*Phylloscopus brooksi*, Hume, Str. Feath. ii. p. 505.

Pahpoon (*D.*).]

299. *REGULOIDES TROCHILOIDES* (J. 564).

Amherst.

[Karen hills, from 3000 to 4000 feet (*W. R.*); Tonghoo (*L.*); neighbourhood of Pahpoon (*D.*).]



\*300. *R. SUPERCILIOSUS* (J. 565).

Arakan, Tenasserim.

[Tonghoo, Karen hills, from 700 to 2500 feet (*W. R.*).]

\*301. *R. PROREGULUS* (J. 566).

Arakan.

[Pine forests north of Pahpoon (*D.*).]

302. *R. VIRIDIPENNIS* (J. 567).

Originally described from the Tenasserim hills, and since obtained plentifully at Darjeeling.

[Karen hills, from 2000 to 4000 feet (*W. R.*).]

[303. *R. EROCHROA* (J. 568).

Karen nee, Karen nee hills at 3000 feet (*W. R.*).]

\*304. *ABRORNIS XANTHOSCHISTUS* (J. 572).

Arakan.

305. *A. SUPERCILIARIS* (J. 574).

*A. superciliaris*, Tickell, J. A. S. B. xxviii. p. 414.

Originally described from the Tenasserim hills, and since found to be common at Darjeeling.

[Tonghoo hills, Karen nee (*W. R.*).]

[306. *A. CHRYSEA*, n.s.

Above bright oil-green, two broad dark stripes springing from the forehead, passing over the head and descending down the sides of the neck, where they are almost black. A central single stripe thus formed on the head, yellowish-green. A broad stripe, springing near the nostril and passing over the eye, and thus bounding the dark stripe, bright yellow. Ear-coverts mingled black and green. Cheeks, chin, throat, thigh-coverts, under tail-coverts, shoulder-edge, under shoulder-coverts, and axillaries, bright canary-yellow. Breast paler yellow, shading to pale silky grey on the abdominal region and flanks. Quills light brown, edged externally with bright greenish yellow. Major wing-coverts tipped and edged with yellow. Rectrices like the quills, all but the middle pair being edged on their interior margins with very pale yellow. Maxilla brown; mandible pale straw-colour. Wing, 2; tail, 2.75; tarsus, 0.56; bill from forehead, 0.50. Karen hills, ? (*W. R.*).

I am not sure whether this is not *Reguloides fulviventris*, Godwin-Austen, a species founded on a carbolized example, in which the green and yellow may have become changed to grey, or altogether discharged.]



\*307. *CULICIPETA BURKII* (J. 569).

Arakan.

[The generic title, *Cryptolopha*, Swainson, is synonymous and has precedence. The Arakan form may possibly belong to the following species.]

308. *C. TEPHROCEPHALUS*.*C. tephrocephalus*, J. Anderson, P. Z. S. 1871, p. 213.

Bhāmo.

[“Iris, brown; bill, above brown, below yellowish; legs, pale greenish brown, Karen hills, at 3500 feet” (*W. R.*); neighbourhood of Pahpoon (*D.*). Dimensions of the bill in the specimen from the Karen hills equal to those of Darjeeling examples of *C. burkii*.]

*Fam. Garrulacidæ.*

Babblers.

\*309. *GARRULAX LEUCOLOPHUS* (J. 407).

Khásias, Arakan.

\*310. *G. BELANGERI*.*G. belangeri*, Lesson, Bélanger's Voyage, Atlas, t. 4.

Tenasserim provinces.

The Himalayan *G. leucolophus*, the range of which extends to Arakan, the Tenasserim *G. belangeri*, the *G. diardi*, Lesson, = *G. leucogaster*, Walden, of Siam and Cochin-China, and the *G. bicolor*, Lesson, of Sumatra, are mutually representative races or conspecies, but which do not appear to grade into one another. Each in its own range abounds, and from its noisiness is the most prominently conspicuous bird in the forest.

[Tonghoo (*W. R.*); Thayet Myo (*F.*).]

311. *G. STREPITANS*.*G. strepitans*, Tickell, J. A. S. B. xxiv. p. 269.

Tenasserim mountains, where common from 3000 to 5000 feet elevation (*Tickell*).

312. *G. CHINENSIS*.*Lanius chinensis*, Scopoli, Del. Fl. Faun. Insubr. ii. p. 85; *Corvus auritus*, Daudin.

Tenasserim provinces, also South China. Obtained by myself in Upper Martaban, where observed associating with *G. belangeri*.

[Tonghoo. Iris (♂), lake colour; bill, black; legs, dusky brown (*W. R.*).]



313. *G. PECTORALIS* (J. 412).

Arakan. As remarked by Dr. Jerdon, "Specimens from the Himalayas have usually the ear-coverts silver-grey, whilst those from Arakan have them black and grey in every gradation." In some the pectoral band is wanting.

[Thayet Myo, Karen nee (*W. R.*).]

\*314. *G. MONILIGER* (J. 413).

Arakan, Tenasserim. Very similar to the last, and therefore liable to be confounded with it; but it is smaller and conspicuously less robust.

[Rangoon, Thayet Myo, Yey-tho, Karen hills (*W. R.*).]

\*315. *G. ALBIGULARIS* (J. 411).

Tavoy, Siam (*Gould*).

\*316. *TROCHALOPTERON MELANOSTIGMA*.

*Trochalopteron melanostigma*, nobis, J. A. S. B. xxiv. p. 268.

Tenasserim mountains, where obtained by Colonel Tickell, "up to the vast wall-like crags of Moulè-it, 7500 feet."

[Karen nee. Iris (♂), deep chocolate; bill, black; legs, pale brown (*W. R.*).]

[317. *ACTINURA RAMSAYI*.

*Actinura ramsayi*, Walden, Ann. M. N. H. (4), 15, p. 402 (June 1st, 1875).

Karen nee, at 3500 feet. Iris (♂ ♀), light hair brown; bill, horny brown; legs, slaty brown (*W. R.*).]

\*318. *SIBIA MELANOLEUCA*.

*Sibia melanoleuca*, nobis, J. A. S. B. xxviii. pp. 413, 451.

Moulè-it mountain, where obtained by Colonel Tickell. "Evidently exceedingly rare, or confined to elevated peaks. A pair only seen, of which the male was secured. Lively and restless, with a prattling whistle like that of *S. capistrata*." It is a conspecies with *S. capistrata* of the Himalaya, and *S. gracilis*\* of the Khásias.

[319. *S. PICAOIDES* (J. 430).

Karen nee, at 5000 feet (*W. R.*).]

\* J. A. S. B. xx. p. 521; xxvii. p. 422.



\*320. *GAMPSORHYNCHUS RUFULUS* (J. 384).

Arakan, Tenasserim.

[The Tenasserim race has been separated by Mr. Hume under the title of *G. torquatus* (P. A. S. B. 1874, p. 107).]

321. *PTERYTHRIUS ERYTHROPTERUS* (J. 609).*Lanius erythropterus*, Vigors; Gould, B. As. pt. viii. pl. 8.

Bhāmo.\*

322. *P. ÆRALATUS*.*P. æralatus*, Tickell, J. A. S. B. xxiv. p. 267.

Tenasserim mountains, at 3500 to 4500 feet elevation.

[Karen nee hills, from 4000 to 5000 feet. Iris (♀), deep lavender; bill, above black, below lavender; legs, dull white; claws, dark brown (*W. R.*).]

\*323. *ALLOTRIUS MELANOTIS* (J. 611).*Pteruthius melanotis*, Hodgson; Gould, B. As. pt. viii. pl. 11.

Tonghoo.

*Fam. Liotrichidæ.*[324. *CUTIA NIPALENSIS* (J. 612).Karen nee, at 6000 feet (*W. R.*).

Sundeval (M. N. Av. Disp. Tentamen, p. 41) rejects the generic title *Cutia*, and adopts Hodgson's substituted title of *Heterornis*.]

[325. *LIOPTILA ANNECTANS* (J. 613).Karen nee (*W. R.*).

The ferruginous colouring of the lower back, rump, and upper tail-coverts, in the example from Karen nee, is much darker than is observable in a numerous series from Darjeeling, Assam, and the Munipur hills.]

\*326. *LIOTRUX LUTEA* (J. 614).*Sylvia lutea*, Scopoli; Gould, B. As. pt. iii. pl. 17.

Khásias, Arakan, South-west China.

\*327. *L. ARGENTAUROS* (J. 615).*Mesia argentauris*, Hodgson; Gould, B. As. pt. xiv. pl. 10.

Khásias, Tenasserim mountains.

[Tonghoo hills, Karen nee hills, from 1500 to 4000 feet (*W. R.*).]

\* *vide* J. Anderson, Exped. p. 259.





[328. *L. STRIGULA* (J. 616).  
Tonghoo hills (*W. R.*).]

329. *SIVA CYANOUROPTERA* (J. 617).

*S. cyanouroptera*, Hodgson; Gould, B. As. pt. xiv. pl. 12.

Khásias, Tenasserim mountains.

[Karen nee (*W. R.*).]

[330. *MINLA CASTANEICEPS* (J. 619).

Karen nee, at 5200 feet (*W. R.*).]

331. *STAPHIDEA STRIATA* (J. 625).

Is this identical with *I. castaneiceps*, Moore, from the Khásias, and with *S. torqueola*, Swinhoe,\* from China? Obtained by Col. Tickell on Moulè-it mountain at an elevation of 3000 feet.

[Distinct from *S. torqueola*, but doubtfully so from *S. castaneiceps*.]

\*332. *YUHINA GULARIS* (J. 626).

Arakan.

[333. *PROPARUS DUBIUS*.

*P. dubius*, Hume, P. A. S. B. 1874, p. 107.

Discovered by Mr. Davison in pine forests north of Pahpoon. Query  
= *Minla rufogularis*, Mandelli?]

*Fam.* ——— (?) †

\*334. *HERPORNIS XANTHOLEUCA* (J. 630).

Khásias, Arakan, Tenasserim, Malacca. A very closely allied race from Hainan and Formosa is named *H. tyrannula*, by Mr. Swinhoe. ‡

[Common in the Pegu hills (*O.*).]

*Fam.* *Zosteropidæ*.

\*335. *ZOSTEROPS PALPEBROSUS* (J. 631).

*Sylvia palpebrosa*, Tem.; P. Z. S. 1872, pl. xx. fig. 1.

Arakan, Tenasserim, Nicobar Islands.

[Karen hills (*W. R.*).]

\* Gould, B. As. pt. xxiii. pl. 14.

† [Title omitted in MS.]

‡ Ibis, 1870, p. 347, pl. 10.



336. *Z. SIAMENSIS*.*Z. siamensis*, nobis, Ibis, 1867, p. 34.

Tenasserim mountains.

[Rangoon (*W. R.*).][337. *Z. austeni*, n.s.Karen nee, at 2500 feet (*W. R.*).]

Above, dark uniform oil-green; underneath, light yellowish-green; almost pure yellow on chin, throat, and under tail-coverts. A shade of black below the eye. Quills dark brown, edged externally with the colour of the dorsal plumage. Shoulder-edge bright yellow. Axillaries and under shoulder-coverts white tinged with yellow. Rectrices hair-brown, narrowly edged externally with green. Wing, 2.6; tail, 1.50; tarsus, 0.50; bill, from forehead, 0.55.]

*Fam.* ——— (?)<sup>\*</sup>\*338. *MUSCITREA CINEREA*.*Muscitrea cinerea*, nobis; J. A. S. B. xvi. p. 122.

Arakan. A remarkable form, of which the affinities are not obvious. The only specimen became destroyed by insects.

[The type was obtained in the island of Ramree.]

*Fam. Paridæ.*

Titmice.

\*339. *MELANOCHLORA FLAVICRISTATA* (J. 650).*Parus flavocristatus*, Lafr.; Gould, B. As. pt. xx. pl. 15.

Arakan, Tenasserim mountains, Malacca, Sumatra. "One obtained at Kyodan, Salween river" (*Beavan*).

[Karen nee (*W. R.*). The specific title, *sullanea*, Hodgs., has precedence.]

[340. *PARUS COMMIXTUS*.*P. commixtus*, Swinhoe, Ibis, 1868, p. 63.

Karen nee, at 3000 feet. Iris, hair brown; bill, black; legs, plumbeous (*W. R.*); pine forests north of Pahpoon (*D.*). Barely separable from Japanese examples of *P. minor*.]

• [Title omitted in MS.]





[341. *P. NIPALENSIS* (J. 645).

*P. nipalensis*, Hodgson, Ind. Rev. ii. p. 31 (1838).

Thayet Myo (*F.*). The Indian species is now admitted to be distinct from the Javan, *P. cinereus*, and the title of *P. caesi*us, Tickell, has been adopted for it by Mr. Swinhoe. Where or when Tickell published this title I have failed in discovering, yet Jerdon certainly employs it as a synonym (*l. c.*).]

\*342. *MACHLOLOPHUS SUBVIRIDIS*.

*Parus subviridis*, Tickell, J. A. S. B. xxiv. p. 267; xxviii. p. 413.

Tenasserim mountains, at 3500 feet elevation.

[This must still continue a doubtful species. It was founded on a single example, shot at an elevation of 3500 feet in the Tenasserim hills by Col. Tickell. A second individual (much injured) from Tenasserim was identified with it by Mr. Blyth (*l. c.*) four years later. Both appear to have been examples of *M. spilonotus* in immature plumage.]

[343. *M. SPILONOTUS* (J. 649).

Karen nee, at 3500 feet (*W. R.*).]

[344. *ÆGITHALISCUS ERYTHROCEPHALUS* (J. 634).

*Parus erythrocephalus*, Vigors, P. Z. S. 1831, p. 23.

Karen nee, 3000 feet (*W. R.*).]

### Fam. Sittidæ.

#### Nuthatches.

345. *SITTA NEGLECTA*.

*Sitta neglecta*, Walden, Ann. M. N. H. (4), v. p. 218.

Tonghoo.

[Tonghoo, Yey-tho, Karen nee (*W. R.*).]

\*346. *DENDROPHILA FRONTALIS* (J. 253).

Arakan, Tenasserim, Malay countries.

[Tonghoo, Karen nee, Tsanko hills (*W. R.*). Identical with examples from Ceylon, India, Java, and Borneo.]

[347. *CERTHIA DISCOLOR* (J. 245).

Karen nee, 5000 to 6000 feet (*W. R.*).]





## Fam. Timeliidæ.

## \*348. POMATORHINUS HYPOLEUCUS.

*Pomatorhinus hypoleucus*, nobis, J. A. S. B. xiii. p. 319; xiv. p. 559; xxiv. p. 273;  
*P. albicollis*, Horsf., Gray and Mitchell, Gen. Birds, pl. 57.

Nipâl, Khásias, Arakan, Tenasserim.

[349. *P. OCHRACEICEPS*.

*P. ochraceiceps*, Walden, Ann. M. N. H. (4), 12, p. 487.

Tonghoo, Karen nee hills, at 2500 feet. Iris (♂), pale straw-yellow; bill, coral-red, with a marked tinge of orange; legs, greenish (*W. R.*).]

\*350. *P. SCHISTICEPS* (J. 402).

Khásias, Tippera, Arakan.

[Upper Pegu (*O.*).]

\*351. *P. LEUCOGASTER* (J. 403).

Khásias, Arakan, Tenasserim. This and the preceding species resemble each other in colouring; but *P. schisticeps* is altogether larger, and has proportionally longer and coarser bill and feet, with very much longer and straighter claws.

[“Karen nee, at 3000 feet. Iris (♂) straw-yellow; bill, orange-yellow, black at nostrils; legs, slaty (*W. R.*).]

\*352. *P. PHAYREI*.

*P. phayrei*, nobis, J. A. S. B. xvi. 452.

Sikhim, Tavoy, Khásias, Arakan.

\*353. *P. ALBIGULARIS*.

*P. albigularis*, nobis, J. A. S. B. xxiv. p. 274.

This species and *P. hypoleucus* were procured by Colonel Tickell upon Moulè-it mountain, at from 5000 to 6000 feet elevation. According to Mason, it is very common in the province of Tavoy.

[354. *P. MARLÆ*.

*P. marlæ*, Walden, Ann. M. N. H. (4), 15, p. 403 (June 1st, 1875).

Tonghoo hills (*W. R.*).]

[355. *P. ERYTHROGENYS* (J. 405).

Pine forests north of Pahpoon (*D.*).]



\*356. *TIMELIA JERDONI* (J. 396).

*Timalia erdoni*, Walden, Ann. M. N. H. (4), x. p. 61; *T. bengalensis*, Godwin Austen.

"Upper Burma, where much more abundant than in Bengal, and less shy, affecting hedge-rows and villages, instead of the unfrequented grass jungles and thickets, in which alone it is seen in Bengal" (*Jerdon*).

Mr. W. T. Blanford informs me that he has Burmese specimens of intermediate size to *T. jerdoni* and *T. pileata*, Horsfield, rendering the propriety of their separation doubtful.

[Rangoon, Tonghoo (*W. R.*); Pahpoon, Yeboo (*D.*). The continental form must take the title of *T. bengalensis*, Godwin Austen (J. A. S. B. 1872, p. 143), which has priority over mine. As the specific validity of the species in no way depends on its dimensions, the information quoted has no bearing on the point. And this remark equally applies to Mr. Hume's observations (Str. Feath. iii. p. 118). The large series, from various parts, I have had opportunities of comparing with the Javan species, fully support Dr. Jerdon's, Major Godwin Austen's, and my own conclusions.]

\*357. *MIXORNIS RUBICAPILLA* (J. 395).

*Motacilla rubicapilla*, Tickell; Ibis, 1872, p. 376.

Arakan, Tenasserim.

[Karen nee (*W. R.*); both sides of the Pegu hills (*O.*).]

\*358. *PELLORNEUM RUFICEPS* (J. 399).

Arakan, Tenasserim.

359. *P. TICKELLI*.

*P. tickelli*, nobis, J. A. S. B. xxviii. p. 414; *P. subochraceum*, Swinhoe, Ann. M. N. H. (4), 7, p. 257.

Tenasserim mountains.

[Rangoon, Tonghoo, Thayet Myo, Karen hills (*W. R.*).]

360. *P. MINOR*.

*P. minor*, A. O. Hume, Str. Feath. ii. p. 298.

Thayet-myo.

[A synonym of *P. tickelli*.]

\*361. *TURDINUS\* CRISPIFRONS*.

*Turdinus crispifrons*, nobis, J. A. S. B. xxiv. p. 269.

Tenasserim mountains.

\* Generically identical with *Cucopitta*, Bonap. (1850).



362. *T. GUTTATUS.**T. guttatus*, Tickell, J. A. S. B. xxviii. pp. 414, 450.

Tenasserim mountains.

363. *T. BREVICAUDATUS.**T. brevicaudatus*, nobis, J. A. S. B. xxiv. p. 272; Gould, B. As. pt. xxiv. pl. 9; *T. striatus*, Walden.

Khásias, Tenasserim mountains. These three species were discovered by Col. Tickell.

[364. *DRYMOCATAPHUS FULVUS.**Drymocataphus fulvus*, Walden, Ann. M. N. H. (4), 15, p. 401 (June 1st, 1875).Karen nee, at 2500 feet (*W. R.*).]365. *TRICHOSTOMA ABBOTTI* (J. 387).Arakan (Ramri), Moulmein. This bird is barely separable from the (so-termed) *Brachypteryx sepiaria*, Horsfield, which is *Myiothera grisea* of the Leyden Museum, and *Malacopteron olivaceum*, Strickland. Its range extends to Eastern Bengal, and to the Nipálese tarai.[Rangoon, Tonghoo, foot of Karen hills (*W. R.*). Identical with examples from the Garo hills, from hills near Mymensing, from Dunapur, and from Dunsiri valley.][366. *T. MINOR.**T. minor*, Hume, Str. Feath. ii. p. 535.Lemyne, Meeta Myo, Ye (*D.*). Judging by the description, a species of doubtful validity. But, if distinct from the Indian species, probably true *T. abbotti*.][367. *T. RUBIGINOSA.**T. rubiginosa*, Walden, Ann. M. N. H. (4), 15, p. 402 (June 1st, 1875).Karen nee (*W. R.*).]\*368. *ALCIPPE NIPALENSIS* (J. 388).*A. phayrei*, nobis, J. A. S. B. xiv. p. 601, wanting the dark sincipital stripes, is probably the young.Arakan, Tenasserim. "Common, but local, in hilly jungles up to 4000 feet" (*Tickell*).[369. *A. MAGNIROSTRIS*, n.s.Karen nee hills, at 3000 feet (*W. R.*).

All the individuals obtained in the locality named differ from Darjeeling,





Garo hills, and Naga hills examples, by wanting the grey-coloured cheeks and ear-coverts of *A. nipalensis*, and by having the tail brown and not rufous. All the dimensions are greater. Wing, 2.75; tail, 3; tarsus, 0.87.]

\*370. *STRACHYRHIS NIGRICEPS* (J. 391).

Arakan, Tenasserim mountains. "In hilly forests, 3000 feet" (*Tickell*). *Timalia larvata*, S. Müller,\* from Sumatra, is nearly akin and should be compared with it.

[Pegu hills (*O.*).]

[371. *S. RUFICEPS* (393).

Karen nee (*W. R.*); neighbourhood of Pahpoon (*D.*).

A single Karen nee example, in very indifferent order, appears to belong to this species.]

[372. *S. RUFIFRONS*.

*S. rufifrons*, Hume, Str. Feath. i. p. 479.

Pegu hills (*O.*).]

\*373. *S. CHRYSEA* (J. 394).

*S. precognitus*, Swinhoe.

Arakan, South China.

[*S. chrysea* is also stated by Dr. Jerdon to occur in Arakan, and in Mr. Blyth's manuscript the number of that species in Jerdon's Birds of India (394) is added to the title. But it is evident that *S. precognita*, Swinhoe, cannot be a synonym, for it is the name of a species nearly allied to, although distinct from, *S. ruficeps*. This last species was probably omitted by Mr. Blyth through accident, while to it he doubtlessly intended to add *S. precognita*, Swinhoe, as a synonym, and not to *S. chrysea*.]

[374. *S. ASSMILIS*, n.s.

Above cinereous olive-green. Feathers of the head yellow, with brown central streaks. Cheek and ear-coverts, pale brown tinged with yellow. Entire under surface, dilute yellow. Quills, brown edged externally with pale yellow. Rectrices, cinereous brown tinged with olive-green. Wing, 1.92; bill, from forehead, 0.56; tail, 1.92; tarsus, 0.58.

"Karen nee (♂, ♀) at 2800 feet of elevation. Iris (♂), lake; bill, lavender, pink at base of mandible; legs, brownish yellow; feet, greenish. Iris (♀), brown; bill, dark plumbeous, pinkish at base of mandible; legs, light greenish-brown" (*W. R.*).]

\* Bonap. Consp. Av. i. p. 217.





\*375. *PYCTORHIS SINENSIS* (J. 385).

"Very common in Upper Burma" (*Jerdon*). I noticed it abounding in the vicinity of Akyab.

[Karen nee (*W. R.*); Thayet Myo (*O.*).]

376. *P. ALTIROSTRIS*.

*Chrysomma altirostre*, *Jerdon*, *Ibis*, 1862, p. 22.

Common at Thayet Myo.

[This species has not been recognized since Dr. *Jerdon* described it thirteen years since. By some it is regarded as nothing but *P. sinensis*, a species thoroughly well known to Dr. *Jerdon*. But, moreover, he mentions (*l. c.*) that "it will probably be considered worthy of separation as a sub-genus," and that it "makes an approach to the *Paradoxornis* group." In conversation Dr. *Jerdon* has asserted that it was a "good species." ]

\*377. *PARADOXORNIS RUFICEPS* (J. 375).

*Paradoxornis ruficeps*, nobis; Gray and Mitchell, *Gen. Birds*, pl. 94, fig. 1; Gould, *B. As.* pt. vi. pl. 12.

Received from Arakan, and the only species as yet received from any part of British Burma, though others may be expected to inhabit the same localities.\*

[Karen nee, at 2500 feet (*W. R.*).]

[378. *P. GULARIS* (J. 374).

*P. gularis*, Horsf.; Gray and Mitchell, *Genera of Birds*, ii. pl. 94, fig. 2.

Karen nee, at 5600 feet (*W. R.*).]

### Fam. Megaluridæ.

\*379. *CRATEROPUS GULARIS*.

*Chatarhea gularis*, nobis, *J. A. S. B.* xxiv. p. 478.

"The familiar garden-babbler of Thayet Myo, and still more abundant and familiar higher up the Irawádi, as Mr. W. J. Blanford informs me" (*Jerdon*).

[Thayet Myo (*W. R.*).]

\* *Suthora brunnea*, *J. Anderson*, *P. Z. S.* 1871, p. 211. Momien, Yunan. 4500 feet.





380. *C. EARLEI* (J. 439).

"Not rare at Thayet Myo, but confined entirely to the long grass and reeds on the islands and *churrs* of the Irawádi" (*Jerdon*).

\*381. *C. CAUDATUS* (J. 438).

Arakan, Thayet Myo. As this and the two preceding species are absolutely congeneric with sundry African species of undoubted *Crateropus*,\* I can only refer them to that genus. It is remarkable that the true *Mala-cocerci*, so characteristic of India and Ceylon, have no typical representative in the countries eastward of the Bay of Bengal.

\*382. *MEGALURUS PALUSTRIS* (J. 440).

The range of this species extends from India, Assam, and Burma to Java and the Philippines. I do not remember to have seen it, however, in collections from the Malayan peninsula.

\*383. *DRYMOECA LONGICAUDATA* (J. 544).

Arakan.

[384. *DRYMOECA BLANFORDI*, n.s.

Above brown (darkest on the head), with an olive-green tinge, which is in some very distinct on the rump. A dull, broad, albescent stripe springing from the base of the bill, and extending back over and beyond the eye. Ear-coverts mingled albescent and pale brown. Cheeks, wing lining, and all the lower surface of body yellowish white, faintly rufescent on flanks and thigh-coverts. Quills, brown externally, narrowly edged with olive-green. In some with an indistinct rufous shade. Rectrices, pale brown above; albescent underneath. All but middle pair with a bold subterminal brown transverse isolated mark. Middle pair with a faint indication of a dark terminal spot. (♂) Wing, 2; tail, 2.50; tarsus, 0.82; bill, from forehead, 0.58.

"Iris (♀), dark buff; maxilla, horny brown, mandible, pale; eyelids, yellowish brown; legs, dull white. Iris (♂), yellowish brown; bill, fleshy brown; eyelids, yellowish brown; Tonghoo" (*W. R.*).]

\*385. *PRINIA FLAVIVENTRIS* (J. 532).

Arakan, Tenasserim, Malacca.

[Rangoon (*W. R.*). The type of Delessert's species came from Bhootan. Assam (Tezpur) examples obtained by Major Godwin Austen agree with

\* *Cf. Ibis*, 1867, p. 6.





Delessert's diagnosis, the ear-coverts and the lores being grey; the superciliary region being dark coloured like the head. Sylhet individuals do not differ, but specimens from the Munipur hills, while otherwise undistinguishable, possess pure white lores continued into a bold pure white supercilium. Out of a large series obtained by Lieutenant W. Ramsay at Rangoon, one only has the lores and superciliary ridges pure white. All the other specimens being like the Assam and Sylhet birds. In my series of the Javan representative form, *P. familiaris*, one example only has white lores and supercilium. The presence of a white supercilium does not appear to indicate the sex, for all the Munipur birds whose sex had been determined are marked ♂, while the single Rangoon example with a white supercilium is noted a ♀, and the others, some ♂ and some ♀.]

\*386. *P. RUFESCENS*.

*P. rufescens*, nobis, J. A. S. B. xvi. p. 456; *P. beavani*, Walden.

Arakan, Pegu.

[*P. beavani* is a distinct species. *P. rufescens* is a very rufous form of *P. gracilis*.]

[387. *P. GRACILIS* (J. 536).

Rangoon (*W. R.*); Pegu (*O.*); Kollidoo (*D.*).]

[388. *P. HODGSONI* (J. 538).

Rangoon, Karen nee (*W. R.*); Thayet Myo (*O.*).]

[389. *P. BEAVANI*.

*P. beavani*, Walden, P. Z. S. 1866, p. 651.

Yey-tho, Karen hills, at 2000 feet (*W. R.*); Thayet Myo (*O.*); Tenasserim (*D.*).]

\*390. *CISTICOLA SCHLÆNICOLA* (J. 539).

Arakan, Pegu, Hainan, South China, Formosa.

[391. *HOREITES PALLIDIPES*.

*Phylloscopus pallidipes*, Blanford, J. A. S. B. 1872, p. 162, pl. vii.

Pahpoon (*D.*).]

[392. *H. SERICEA*, n.s.

Above uniform, rather dark, brown washed with an olive tint, having in some lights a ruddy tone. Under-surface of body and wing-lining silky white, the flanks, thigh-coverts, and under tail-coverts sullied with pale





brown. Cheeks and ear-coverts mixed pale brown and white. Space before the eye and superciliary ridges, sordid white. Quills and rectrices brown, edged with the colour of the upper plumage. Wing, 2; tail, 1.75; tarsus, 0.68; bill, from forehead, 0.60.

"Iris (♀), dull brown; bill, yellow; legs, fleshy white. Karen hills" (*W. R.*).]

[393. *SUYA CRINIGERA* (J. 547).

Thayet Myo (*O.*).]

[394. *S. ERYTHROPLEURA*, D.S.

Male, above rufous brown, the base of the feathers being ash. On the lower back and upper tail-coverts the rufous hue predominates. Space before the eye, dark brown. A white line, springing from near the nostril, passes back over and behind the eye. Ear-coverts, cheeks, chin, throat, breast, abdomen, and wing-lining, creamy white, strongly suffused with rufo-fulvous. Flanks, thigh-coverts, and under tail-coverts bright ferruginous. Quills, brown edged with ferruginous. Rectrices like the back.

(♂) Wing, 1.87; tail, 4.87; tarsus, 0.88; bill, from forehead, 0.65. Tonghoo (*W. R.*).]

\*395. *ORTHOTOMUS LONGICAUDA* (J. 530).

Of general occurrence, extending eastward to South China and Formosa, and southward to Singapore.

• [Tonghoo, Karen nee (*W. R.*); Thayet Myo (*O.*); Tenasserim (*D.*). The Ceylon and Indian Tailor-bird must stand *O. sutorius* (G. R. Forster), Zool. Ind. p. 17 (1781), even if it be considered identical with the South China species, *Muscicapa longicauda*, Gm. = *O. phyllorrhaphus*, Swinh., which it appears to be.]

\*396. *O. EDELA*.

*O. edela*, Tem., P.C. 599, fig. 2.

Tavoy, Siam (*Gould*). According to Mason, "Tailor-birds are very common at Tavoy, though rare at Moulmein." He is not likely to have discriminated the particular species.

[I am not certain which species is intended by Mr. Blyth. The authority of Mr. Gould is quoted for the occurrence of this Javan race of the common Indian Tailor-bird at Tavoy and in Siam. The Javanese *O. edela* and the Indian *O. sutorius* are barely separable, the Javan being chiefly distinguished by having the lores and superciliary stripe pale ferruginous, and not greyish-





white. All the Burman examples, and those from Siam, I have been able to examine, belong to *O. sutorius*. Formerly Mr. Blyth mistook the more recently described *O. flavi-viridis*, Moore, for *O. edela*, and Moore's species does occur in Burma.]

[397. *O. FLAVI-VIRIDIS*.

*O. flavi-viridis*, Moore, P. Z. S. 1854, p. .

Rangoon (*W. R.*).

The description of *O. nitidus*, Hume, agrees well with this species, before the grey throat and black\* breast-feathers have been assumed. Mr. Hume's specimens were obtained at Pahpoon, Kyouknyat, and Thayet-chaun.]

[398. *O. CORONATUS* (J. 531).

Tsan koo hills, at 3000 feet (*W. R.*).]

[399. *LOCUSTELLA LANCEOLATA*.

*Sylvia lanceolata*, Tem., Man. d'Orn. iv. p. 614; *Locustella subsignata*, Hume; cf. Dresser, B. Eur. parts 35 and 36.

Yeboo (*D.*).]

Fam. Laniidæ.

Shrikes.

\*400. *LANIUS TEPHRONOTUS* (J. 258).

Arakan.

[Kyouknyat (*D.*).]

\*401. *L. NIGRICEPS* (J. 259).

*L. nigriceps*, Frankl.; Gray and Mitchell, Gen. Birds, pl. 71.

Arakan, Siam.

[Tonghoo (*W. R.*); neighbourhood of Pahpoon (*D.*).]

\*402. *L. CRISTATUS* (J. 261).\*

Arakan.

[Rangoon, Karen nec (*W. R.*); Thayet Myo (*O.*); Tenasserim (*D.*).]

\* vide Lord Walden, "On the Rufous-tailed Shrikes," Ibis, 1867, p. 212. Mason includes *L. tigrinus*, Drapiez, but I know not on what authority.



403. *L. COLLURIOIDES*.

*L. collurioides*, Lesson, Voyage Bélanger, p. 250 ; *L. hypoleucus*, nobis, J. A. S. B. xvii. p. 249.

Pegu, Martaban, Tenasserim provinces, Siam. "Thayet Myo and Ava in cold season only" (*W. T. Blanford*).

[Rangoon, Tonghoo, Thayet Myo, Karen nee (*W. R.*).]

\*404. *TEPHRODORNIS PELVICA* (J. 263).

Arakan, Tenasserim, Hainan.

[Karen hills (*W. R.*); Thayet Myo (*O.*).]

\*405. *T. PONTICERIANA* (J. 265).

Pegu.

[Tonghoo (*W. R.*); Thayet Myo (*O.*).]

\*406. *HYLOTERPE PHILOMELA* (J. 266).

Arakan, Pinang, Java, Borneo, Andaman Islands.

[Must stand *Hyloterpe grisola* (Blyth). *Hylocharis occipitalis*, Hume, Str. Feath. ii. p. 202, is synonymous.]

407. *HEMIPUS OBSCURUS*.

*Muscicapa obscura*, Horsfield ; *M. hirundinacea*, Reinwardt.

Mergui.\*

[408. *H. PICATUS* (J. 267).

*Muscicapa picata*, Sykes, P. Z. S. 1832, p. 85.

Tonghoo, Karen nee, at 1500 feet, Tsan koo hills (*W. R.*); Thayet Myo (*O.*); Pahpoo (*D.*). All the examples sent to me by both Major Lloyd and Lieutenant Wardlaw Ramsay, from the Tonghoo province, belong to the South Indian and Ceylon species. But Mr. Blyth seems to be correct in his opinion that the Assam bird, *M. capitalis*, is a distinct species. All the examples of the male I have seen from Darjeeling, Assam, and the Naga hills, have the back brown, and the head alone black (*cf.* Blyth, Ibis, 1866, p. 368 ; Jerdon, *op. cit.* 1872, p. 116; and compare Hume, Str. Feath. 1873, p. 435 ; 1875, p. 93). Young males in both species wear the female dress. The young *H. picatus* in transition plumage, before assuming the full black dorsal garb, shows brown on the back. *H. capitalis*, ♂, when adult, retains the brown colouring on the back ]

\* Mason also gives *M. picatus*, meaning doubtless *M. capitalis* (*cf.* Ibis, 1866, p. 368).





## Fam. Graucalidæ.

## \*409. GRAUCALUS MACEI (J. 270).

Arakan, Tenasserim.

[Rangoon, Tonghoo hills, Karen nee from 2500 feet to 4000 feet (W. R.); Thayet Myo (F).]

## \*410. VOLVOCIVORA AVENSIS.

*Volvocivora avensis*, nobis, Catal. p. 327; *C. melanoptera*, nobis, J. A. S. B. xv. p. 307.

Common in Arakan.

[Rangoon, Tonghoo, Thayet Myo, Karen nee (W. R.); Pabyouk, near Amherst (D.).]

## \*411. V. SYKESI (J. 268).

Upper Pegu.

## [412. V. MELANOSCHISTUS (J. 269).

*V. melaschistos*, Hodgson, Ind. Rev. i. p. 328 (1836).

Examples obtained at Pahpoon, Pabyouk, Ye-boo, and Ye, by Mr. Davison, are thus identified, with doubt, by Mr. Hume (Str. Feath. ii. p. 474).]

## \*413. PERICROCOTUS SPECIOSUS (J. 271).

*Turdus speciosus*, Lath.; Gould, B. As. pt. ix.; *P. rutilus*, Gould; *P. fraterculus*, Swinhoe; *P. andamanensis*, Tytler. *Hynet-men-tha* ♂, *hynet-men-thamie* ♀ ("Prince and Princess Bird," Mason).

Arakan, Tenasserim, Andaman Islands, Khásias, Siam; and Hainan (*Swinhoe*). Mr. V. Ball remarks of this species that "the amount of red on the central tail-feathers varies much in specimens from various parts of India and Burma." Four out of five males from the Andamans have the central tail-feathers wholly black. The specimens in Lord Walden's collection from India have black middle tail-feathers, while in those from Burma the outer web is red. Others sent by Mr. Swinhoe as *P. fraterculus* do not appear to be separable.

[Tonghoo, Karen nee (W. R.); Thayet Myo (O.). Out of a numerous series from Tonghoo and its vicinity only one male has the middle pair of rectrices completely black; while in all the females, without exception, they are entirely black. Some Assam examples have the middle pair black.]

## \*414. P. BREVIROSTRIS (J. 273).

*Phanicornis brevirostris*, Vigors; Gould's Century, pl. 8.

Arakan.

[Karen nee, at 3000 feet (W. R.); pine forests north of Pahpoon (D.).]



\*415. *P. ROSEUS* (J. 275).*Muscicapa rosea*, Vieillot; Gould, B. As. pt. ix. pl. —

Arakan.

[Tonghoo (*W. R.*); Pahpooon (*D.*).]\*416. *P. PEREGRINUS* (J. 276).*Parus peregrinus*, Linn.; Gould, B. As. pt. ix. pl. —

Arakan, Tenasserim. Common; some of the males very brightly coloured, and appearing to grade into *P. flagrans*, Boiè, of the Malayan peninsula, Sumatra, and Borneo. Mr. V. Ball remarks that "Andaman specimens correspond to the darker-plumaged variety of this bird from Madras and Ceylon, from one of which Gould's figure is taken."

[Tonghoo (*L.*); Karen nee (*W. R.*); Thayet Myo (*F.*).] *P. flagrans*, Boiè, in no way resembles *P. peregrinus*, otherwise than by its small dimensions. It is a diminutive form of *P. ardens*, Boiè, which, in its turn, is a small form of *P. speciosus*. The female of *P. flagrans* is yellow and grey, as in the other two species. *P. peregrinus* is a distinct type, and has no known representative in any part of the Malayan sub-region.]

\*417. *P. ALBIFRONS*.*P. albifrons*, Jerdon, Ibis, 1863, p. 20.Thayet-myo. An interesting "double" of the Indian *P. erythropygius*.[Tonghoo (*L.*); Thayet Myo (*O.*).]

## Fam. Pipridæ.

## Manakins.

\*418. *CALYPTOMENA VIRIDIS*.

*Calyptomena viridis*, Raffles; Horsfield, Zool. Res. in Java, pl.; Stoliczka, J. A. S. B. xxxix. pt. 2, p. 284.

Tenasserim mountains.\*

"These birds resort to dense thickets when alarmed, but will sally out to feed on fruits (wild figs), and they mingle with Barbets and other birds while so doing. The note is low and sweet—a low whistle. Like the *Eurylaimi*, they are tame and stupid" (*Tickell*). Helfer also procured this species in the Tenasserim provinces.

\* vide J. A. S. B. xiii. p. 243; Tickell, *op. cit.* xxiv. p. 279.



Fam. **Eurylæmidæ.**

## Broadbills.

\*419. **SERILOPHUS RUBROPYGUS** (J. 139).

*Raya rubropygia*, Hodgs.; Gould, B. As. pt. v. pl. —  
Arakan, Khásias, S. E. Himalaya.

\*420. **S. LUNATUS.**

*S. lunatus*, Gould; B. As. pt. v. pl. —

Tenasserim provinces. "These birds are much better flyers than the *Eurylaimi*. I found them once in a flock, like Titmice, but very high up" (*Tickell*). Dr. Helfer states, in his MS. notes quoted by Mr. F. Moore, "that he observed this bird in societies of thirty or forty, upon the loftiest trees in the forests in the Tenasserim provinces; and that they are so very fearless that the whole flock can be shot down one after the other." He only observed them on one occasion.

["Iris, iridescent green and brown; bill, turquoise blue, paler towards the tip; region of nostrils, gape, and under surface of basal half of mandible, orange; legs, orange-green; claws, bluish-white" (*W. R.*). Karen hills, 30 miles north of Tonghoo (*L.*); Karen nee, at 3000 and 4000 feet (*W. R.*); Pahpoon, Amherst, Om-ben-gwen (*D.*).]

421. **CORYDON SUMATRANUS.**

*Coracias sumatranus*, Raffles; Gould, B. As. pt. v. pl. —

Tenasserim provinces, Malacca, Sumatra, Borneo. "A singular and rare bird; crepuscular (very likely diurnal as well), and so stupid and tame as to allow itself to be pelted without moving" (*Tickell*).

[Karen hills (*W. R.*).]

\*422. **EURYLEMUS JAVANICUS.**

*Eurylemus javanicus*, Horsf.; Gould, B. As. pt. v. pl. —

Tenasserim provinces, Malayan peninsula, Sumatra, Java, Borneo.

"Not common, at least it is not often seen, being very quiet and secluded, though excessively tame, and not crepuscular like *Corydon*" (*Tickell*).

[Tonghoo hills (*L.*).]

423. **E. OCHROMELAS.**

*E. ochromelas*, Raffles; Gould, B. As. pt. v. pl. —

Tenasserim provinces, Malayan peninsula, Sumatra, Borneo.





## 424. CYMBORHYNCHUS MACRORHYNCHUS.

*Todus macrorhynchus*, Gm.; Gould, B. As. pt. v. pl. —

Bassein, Tenasserim provinces, Siam, Malayan peninsula, Sumatra, Borneo.

[Count Salvadori has recently (Atti R. Ac. Sc. Torino, ix. p. 421) restricted Latham's Great-billed Tody to Sumatra and Borneo, also to Java, but with a doubt, and has separated the Malayan Broadbill under a new title, *C. malaccensis* (t. c. p. 425). True *C. macrorhynchus*, according to the Count, has a black and unspotted tail; whereas the Malayan bird, on the three outer pairs of rectrices, has, towards the apex, and on the inner webs, a white oblique spot. In the Malaccan bird this is so, and Sumatran examples will more probably be found to agree with the Malaccan rather than with the Bornean. But to which race Latham's type, contained in the Leverian Museum, belonged, Count Salvadori does not make quite clear. Latham's type, however, is, as the Count mentions, and as Herr von Pelzeln has told us (Ibis, 1874, p. 19), extant in the Vienna Museum. We may therefore assume that the Count, with his accustomed accuracy, has satisfied himself on the point.]

\*425. *C. AFFINIS*.*C. affinis*, nobis, J. A. S. B. xv. p. 312; Gould, B. As. pt. 5, pl. —Arakan (Ramri), Tavoy (*Gould*), Siam, and Cambodja (*G. R. Gray*).\*426. *PSARISOMUS DALHOUSIE* (J. 138).*Eurylaimus dalhousie*, Jameson; Gould, B. As. pt. v, pl. —

Arakan, Tenasserim, Sumatra. "On the table-land of Cherra Punji," remarks Mr. Frith, "flocks of this bird often ascend, while, as they fly about from garden to garden, the native boys hunt them by intercepting and turning their flight away from the gardens, when they are soon fatigued and easily caught with the hand" (J. A. S. B. 1855, p. 279, note).

[Karen hills, at 3000 feet (*W. R.*). I can find no record of a comparison having been made between this species and Sumatran *E. psittacinus*, S. Müll.]

Fam. *Hirundinidæ*.

## Swallows.

\*427. *HIRUNDO RUSTICA* (J. 82).

Mostly of the smaller eastern race (*H. gutturalis*, Scopoli), but I think not exclusively so. Arakan, Tenasserim.

[Tonghoo (*W. R.*); Thayet Myo (*O.*).]



[428. *H. TYTLERI*.*H. tytleri*, Jerdon, B. Ind. iii. p. 870.Thayet Myo (*O.*); Tavoy (*D.*).][429. *H. HORREORUM*.*H. horreorum*, Barton, Fragm. N. H. 1799, p. 17.Tonghoo (*W. R.*). Undistinguishable from Californian examples.][430. *H. FILIPERA* (J. 84).Pahpoon (*D.*).]\*431. *CECROPIS ERYTHROPYGIA* (J. 85, *partim*).*Hirundo erythropygia*, Sykes; Gould, B. As. pt. xx. pl. 10; Ibis, 1866, p. 337.

Common in parts of the jungles, at least during the northern winter.

[432. *C. STRIOLATA*.*Hirundo striolata*, Tem., Faun. Japonica, p. 33.

Karen nee, at 2600 feet, in March; Karen hills, at 3000 feet, in January (*W. R.*). Identical with Flores, Formosan, and Chinese examples. Quite distinct from *C. erythropygia*, which is barely separable from *C. rufula*.]

433. *CHELIDON URBICA* (J. 92).

Col. Tickell writes: "There are great numbers here" (at Moulmein) "in the season; and I have also seen large flocks of them in India, but they appear from time to time, not constantly, as does *H. rustica*."\*

\*434. *COTYLE SINENSIS* (J. 89).Common along the rivers, where it holds the place of *C. riparia* in Europe.

[Tonghoo (*W. R.*); Pahpoon (*D.*). *C. obscurior*, Hume, Str. Feath. iii. p. 43, is founded on a single indifferent specimen of a species of *Cotyle* obtained at Thayet Myo by Mr. Oates.]

*Fam. Artamidæ.*

## Clusterers.

\*435. *ARTAMUS FUSCUS* (J. 287).

Arakan, Tenasserim, Siam, Hainan. In the Andamans and Nicobars, *A. leucorhynchus* (Lin.) replaces it.

[Tonghoo, Thayet Myo, Karen hills (*W. R.*).]

\* J. A. S. B. xxiv. p. 809.





## Fam. Dicruridæ.

## Drongos.

\*436. *CHIBIA HOTTENTOTA* (J. 286).

Arakan.

[Tonghoo, Karen hills (*W. R.*); Pahpoon, Moulmein (*D.*).]

\*437. *BHIRINGA REMIFER* (J. 283).

Arakan, Tenasserim.

[Tonghoo, Karen hills (*W. R.*); Thayet Myo (*O.*). The Burman examples, as well as Indian, are not separable from the Javan.]

\*438. *CHAPTIA ÆNEA* (J. 282).

Arakan, Tenasserim.

[Tonghoo, Karen hills, Karen nee (*W. R.*); Thayet Myo (*O.*). *C. malayensis*, A. Hay, is identical with the Sumatran *Edolius picinus*, S. Müller, Bp. Consp. i. p. 352, the type of which I have compared at Leyden.]

\*439. *DISSEMURUS PARADISEUS* (J. 284, *partim*).

Arakan, Tenasserim. I provisionally bring together the various races of *Bhimrāj* (as they are designated in Bengal), because it appears to me that their differentiation is not yet sufficiently understood; but specimens from different localities differ much in size and in the development of the frontal crest. In some the latter is rudimentary, if it exist at all; while in others it attains a length of  $2\frac{1}{2}$  in.,\* the frontal plumes flowing over and beyond the occiput. The ordinary length in Burmese specimens is about  $1\frac{1}{2}$  in. In one specimen in the Calcutta Museum, which is believed to have been procured by Helfer, the frontal crest is rudimentary, whilst the racket tail-feathers attain very unusual length, the unwebbed portion of them being much more spirated than I have seen in any other. Again, there is one race, found especially in Tippera, with the frontal crest  $2\frac{1}{2}$  in. long, and the closed wing  $6\frac{3}{4}$  in. But, with the exception perhaps of this Tippera bird, there would seem to be all possible gradations in different localities, especially as regards the development of the frontal crest. The longest crested (or Tippera form) is styled *Chibia malabaroides* by Mr. Hodgson,† and the *Edolius grandis*, Gould,‡ is described to have the crest  $1\frac{1}{2}$  in. in length. *E. paradiseus* (*Cu-*

\* *vide* figure in J. A. S. B. xv. p. 295.

† India Review, 1837, p. 325; *syn. Lanius malabaricus*, as figured by Latham and Shaw, not as described by Latham from Sonnerat's figure.

‡ P. Z. S. 1836, p. 3.



*culus paradiseus*, L.) is based on Brisson's *Cuculus cristatus siamensis*, founded on a drawing by Poivre of a Siamese specimen, and should therefore denote the ordinary Tenasserim bird, which is identical with the *Bhimráj* of the Calcutta bird-dealers. As observed in captivity, this species has astonishing powers of mimicry.\* I had one which imitated the fine song of the Sháma (*Cittocincla macroura*) to perfection; also the crowing of cocks, and every other sound produced by domestic poultry, the cawing of crows, the notes of various other wild birds, the bleating of calves, the cry of a dog being whipped, mewing of cats, etc.; but I do not remember to have heard one sing in the wild state. Mason, however, mentions its loud, flute-like notes, and remarks of one that used to come at sunset every evening, and perch on a bough near his dwelling in Dong-yan; "there it would sit and pour forth an incessant strain of melody for half an hour at a time." As seen alive, it presents a very different appearance from the stuffed specimens exhibited in museums, the hackled feathers of the neck showing to advantage. When tamed it is very fearless and familiar, and may be suffered to have its liberty in country places. It preys with avidity on small birds and other animals. But with all its extraordinary faculty of imitating sounds, the *Bhimráj* never attempts to articulate human speech, in which some examples of the hill maina (*Eulabes*) succeed so admirably.

[Thayet Myo, Karen nee, Tonghoo, Rangoon (*W. R.*). These examples agree with the Siam bird. An individual from Tonghoo, obtained by Major Lloyd, has the outer pair of rectrices feathered along the whole length of the inner side of the shaft. This is found occasionally to occur in individuals of many species of *Dissemurus*. *E. intermedius*, Lesson, is founded on some species, with the outer pair of rectrices fully webbed. Malabar individuals sometimes exhibit the same peculiarity. In *D. megarhynchus* it is normal. On the other hand, *D. lophorhinus* sometimes has the inner web wanting, except at the extremity of the outer rectrices.]

\*440. *BUCHANGA ATRA* (J. 278).

*Muscicapa atra*, Hermann, if distinct from *B. macrocerca* of Java; *Ibis*, 1872, p. 119. Arakan.

[Tonghoo, Karen nee, Rangoon (*W. R.*). *Muscicapa atra* is Hermann's title for the South Indian bird, which is invariably smaller than that of Northern and Eastern India. *D. macrocerca*, Vieillot = *E. longus*, Tem., pertains to the Javan bird alone; a distinct form. Some Burman examples

\* cf. *Ibis*, 1860, p. 99.



possess, while others want, the white rictal spot, an unstable character among the continental races, but never found, so far as at present recorded, in true *B. macrocerca*, nor in *B. cathæca*. Adult Tonghoo birds agree best in the relative proportions of the rectrices with *B. cathæca*.]

#### 441. *B. INTERMEDIA*.

*D. intermedius*, nobis, J. A. S. B. xv. p. 298; xxxix. pt. 2, p. 322; Viscount Walden in P. Z. S. 1866, p. 545.

Arakan hills, near Bassein (*W. T. Blanford*), South Tenasserim, Pinang, Malacca (*Stoliczka*).

[Tonghoo, Karen nee, Karen hills (*W. R.*); Moulmein (*Beavan*). Lieut. W. Ramsay has sent from the localities cited a very numerous series of a species of *Buchanga*, which provisionally, until I have been able to examine typical Penang examples, are here referred to *B. intermedia* (Blyth). They vary but slightly in their dimensions when full grown. Wing, 5.25; outer pair of rectrices, 6.12; middle pair, 4.25. Nor is there much if any variation in their colouring when in perfect plumage. Lores, jet black; under surface, pure uniform bluish-ash, with little or no gloss; above, glossy bluish-ash, somewhat darker than below, and paler on the rump; rectrices, ashy-blue. They are almost identical in colouration with Javan *B. leucophæa*, that bird however being smaller, and having a less forked tail. Wing of *B. leucophæa*, 5; outer pair of rectrices, 5.38; middle pair, 4. Among a large number of Javan birds I can find no variation of colouration when in perfect plumage. *B. mouhoti*, Walden, is not separable from this Burman form.]

#### [442. *B. PYRRHOPS*.

*Dicrurus pyrrhops*, Hodgs., Gray's Zool. Misc. p. 84, no. 553.

Rangoon, (*W. R.*).

The Rangoon examples sent by Lieutenant W. Ramsay are all referable to *B. pyrrhops*. They are identical with individuals from Deyra Doon, Nipaul, and Dacca. In colouration they do not differ from *B. intermedia*, but their dimensions are considerably larger. Wing, 5.75; outer pair of rectrices, 6.50; middle pair, 4.50. In perfect plumage they do not vary among one another. Nor can either they or *B. intermedia* be confounded with fully-plumaged examples of *B. longicaudata*, either from Malabar, Ceylon, Simla, Mussoorie, Nipaul, Darjeeling, and Asalu. The ashy Drongos have no representative in Southern India or in Ceylon. While *B. longicaudata* has no representative in Java, so far as is yet recorded, nor have I ever seen a Malaccan or Burman example of it. Along the lower ranges of the



Himalaya it certainly occurs, and there meets *B. pyrrhops*. In immature plumage *B. longicaudata* might, by a superficial observer, be mistaken for *B. pyrrhops*. But in adult full dress it is as distinct as it is from *B. atra*, with which, however, it was also for long confounded. By some *B. leucophæa*, *B. intermedia*, and *B. pyrrhops* might be considered as constituting one species, but no author who had studied the subject would unite them with *B. longicaudata*. The *D. cineraceus*, Horsf., *apud* Blyth (J. A. S. B. 1846, p. 299), and there described by Mr. Blyth from a Malaccan specimen presented by me to the Calcutta Museum, was an example of *B. leucogenys*, in the young plumage before the pure white cheeks are developed, and in which phase of plumage it may be easily mistaken for *B. leucophæa*. It ranges from Malacca through Siam, Camboja, and China, to Japan. It is not unlikely that it, as well as *B. longicaudata*, may be found to occur in Tenasserim. Mr. Blanford gives the last (*Ibis*, 1870, p. 468) from the Bassein district.]

443. *DICRURUS ANNECTENS* (J. 279).

Nipâl, Tenasserim, Malacca.

[Rangoon (*W. R.*). *D. affinis*, Blyth, is synonymous.]

*Fam. Tchitreadæ.*

Flycatchers.

\*444. *TCHITREA AFFINIS* (J. 289).

Arakan, Tenasserim, Malacca.

[Thayet Myo (*W. R.*). The oldest and correct generic title is *Muscipeta*, Cuvier. Count Salvadori (Uccelli, Borneo, p. 137) adopts *Terpsiphone*, Glogger, a more recent title for an undefined genus.]

[445. *T. PARADISI* (J. 288).

Mr. Hume thus identifies, but with doubt (*Str. Feath.* iii. p. 474), a single example of an "immature female" obtained at Lemyne by Mr. Davison.]

[446. *PHILENTOMA VELATUM*.

*Drymophila velata*, Tem. P. C. 334.

Om-ben-gwen (*D.*).]

\*447. *HYPOTHYMYS AZUREA* (J. 290).

Arakan, Tenasserim, Malay countries, Philippines. Common.

[Thayet Myo (*O.*).]



## \*448. MYIALESTES CINEREICAPILLA (J. 295).

Arakan, Tenasserim, Malacca.

[Tsan koo hills, Karen nee, 3500 feet (*W. R.*). The title of this genus must stand *Culicicapa*, Swinh., it having precedence over *Empidothra*, Sundev.]

## \*449. LEUCOCERCA ALBIFRONTATA (J. 292).

Tonghoo.

[Thayet Myo (*O.*). Lesson's specific title, *aureola* (Tr. p. 390), was published during the same year as that of Franklin. Until we have means of determining the month, or day of the month of the year 1831, on which the *Traité* was published, it will be most convenient to retain the title by which the species is best known. Franklin published his title on the 9th of August.]

[450. *L. ALBICOLLIS* (J. 291).*Platyrrhynchus albicollis*, Vieillot, N. Dict. 27, p. 13 (1818).

Karen nee hills, at 4000 feet (*W. R.*); Pahpoon (*D.*); Thayet Myo (*O.*).]

451. *L. JAVANICA*.*Muscicapa javanica*, Sparrman, Mus. Carls. pl. 75.

Mergui, Siam. The common species of the Malay countries.

## [452. CHELIDORNYX HYPOXANTHA (J. 294).

*Rhipidura hypoxantha*, Blyth, J. A. S. B. xviii. pp. 930, 935.Tonghoo hills (*W. R.*).]

## Fam. Brachypodiidæ.

## Bulbuls.

## \*453. HYPISIPETES PSAROIDES (J. 444).

Arakan, Fokien province, China (*Swinhoe*).454. *H. CONCOLOR*.

*H. concolor*, nobis, J. A. S. B. xviii. p. 816, probably *H. yunnanensis*, J. Anderson, P. Z. S. 1871, p. 213.

Tenasserim mountains (Bhamo district?). This and the preceding, a Himalayan race (found also on the Khásias), the darker-coloured *H. ganessa* of South India, the still darker *H. nigerrimus*, Gould, of Formosa, and the black *H. perniger*, Swinhoe, of Hainan, are geographical representatives of



each other, or conspecifics, and it is remarkable that Ceylon examples are not so dark coloured as are those from the mainland of South India, nor so grey as are Himalayan specimens. In *Turdus melaleucus*, J. E. Gray (*H. niceiceps*, Swinhoe), of China, however, we have the same type, with the coral-red bill, but the black cap replaced by pure white; a remarkable variation, which is repeated among the black-headed and white-headed cinnamon-coloured munia grosbeaks.

[Tonghoo, Karen hills, at 1500 feet. Iris, hair-brown; bill and legs, lake-red (*W. R.*). *H. yunnanensis*, Anderson, is synonymous. The white-capped Chinese species must stand *H. leucocephalus* (Gm.), founded on Sonnerat's *Merle Dominiquain de la Chine*, Voy. Indes, ii. p. 191.]

\*455. *H. MACCLELLANDI* (J. 447).

*H. holti*, Swinhoe, Ibis, 1861, p. 266.

Arakan, South China.

456. *H. TICKELLI*.

*H. tickelli*, nobis, J. A. S. B. xxiv. p. 275.

Tenasserim provinces.

[Karen nee hills, 2500, 4000 feet. Iris, red-brown; bill, brown; legs, fleshy brown (*W. R.*). Under-surface of body plumage hardly distinguishable from the same in *H. malaccensis*.]

\*457. *IOLE VIRIDESCENS*.

*Iole viridescens*, nobis, Ibis, 1867, p. 7; *I. virescens*, nobis, J. A. S. B. xiv. 573.

Arakan, Khásias, Tippera, Tenasserim (where obtained by Helfer).

[Tonghoo (*L.*); Yey-tho, Tsan koo hills (*W. R.*).]

\*458. *HEMIXUS FLAVALA* (J. 448).

*Pycnonotus flavala* (Hodgs.), Gray and Mitchell, Gen. Birds, pl. 59.

Khásias, Arakan, Tenasserim. A representative species, *H. castaneinotus*, Swinhoe, inhabits Hainan.

[*H. hildebrandi*, Hume, Str. Feath. ii. p. 508.

Karen hills, at 2000 feet. Iris (?), lake-brown; bill, black; legs, light brown (*W. R.*); forests north of Pahpoon (*D.*). A representative form, with the head and crest dark brown, not grey. Probably the species determined by Mr. Blyth as *H. flavala*.]

459. *TRACHYCOMUS OCHROCEPHALUS*.

*Turdus ochrocephalus*, Gm.; *Tricopharus crispiceps*, nobis, J. A. S. B. xi. p. 204.

Mergui. Common at Malacca, Sumatra, Java, Borneo.





## \*460. CRINIGER FLAVEOLUS (J. 451).

Arakan, Tenasserim.

[*C. griseiceps*, Hume, Str. Feath. i. p. 478.

Tonghoo hills, Karen nee (*W. R.*); Upper Pegu (*O.*); north of Pahpoon (*D.*). Differs slightly from true *C. flaveolus* by having the feathers washed with a cinereous tinge, but does not appear to have been discriminated by Mr. Blyth.]

461. *C. OCHRACEUS*.*C. ochraceus*, Moore, Cat. E. I. C. Mus. i. p. 252.

Tenasserim (obtained by Helfer).

[This is a small form of *T. gutturalis*, S. Müller.][462. *ALCURIUS STRIATUS* (J. 449).*Trichophorus striatus*, Blyth, J. A. S. B. 1842, p. 184.Tonghoo hills, at 5000 feet (*W. R.*).]\*463. *IXUS FINLAYSONI*.*Pycnonotus finlaysoni*, Strickland, Ann. M. N. H. 1846, p. 411.

Arakan, Tenasserim provinces, Siam. "This," remarks Mason, "is a very common bird in Moulmein, and in the dry season its musical, though little varied notes, are often heard. It is rarely seen at Tavai."

[Tonghoo hills, Karen hills (*W. R.*).][464. *I. ANNECTENS*.*I. annectens*, Walden, Ann. M. N. H. (4), 15, p. 401.Rangoon (*W. R.*).]465. *I. BLANFORDI*.

*Pycnonotus blanfordi*, Jerdon, Ibis, 1862, p. 20; *Pycnonotus familiaris*, nobis, J. A. S. B. xxxi. 343.

Very abundant at Thayet Myo.

[Tonghoo (*W. R.*).]\*466. *I. FLAVESCENS*.

*Pycnonotus flavescens*, nobis, J. A. S. B. xiv. 563; *P. luteolus*, from Siam *apud* Horsf. and Moore, Cat. E. I. C. Mus. 1, p. 243 (?).\*

Khásias, Arakan.

[Tonghoo hills, Karen nee, at from 2500 to 4000 feet. Iris, light brown; bill and legs, black (*W. R.*); north of Pahpoon (*D.*).]

\* Gould gives *P. goiavier* (*Muscicapa goiavier*, Scopoli) from Siam (P. Z. S. 1859, p. 151). The true *I. goiavier*, however, is peculiar to the Philippines, and the species intended by Mr. Gould must stand as *I. analis*.





467. *OTOCOMPSA MONTICOLA*.

*Ixos monticolus*, McClelland, P. Z. S. 1839, p. 160; Ibis, 1867, p. 440.

Khásias, Tenasserim provinces. Probably *O. jocosa*, var. *sinensis*, J. Anderson, from Bhamo. Barely separable from *O. jocosa* of Bengal and Northern India, which again only differs from *O. fuscicaudata*, Gould, of South India, by having white spots on its rectrices. Another instance of different local races or conspecies. Mason remarks that this is one of the most common birds in the neighbourhood of Tavoy.

[Rangoon, Tonghoo, Karen nee, Karen hills (*W. R.*). The Bengal bird must take the specific title of *emeria*, Lin., even if the Chinese race, *Lanius jocosus*, Lin., is identical with it, as stated by Mr. Swinhoe, and who is doubtless correct. Linnæus described the Bengal Bulbul twice over in the 12th edition of the Systema, once under the genus *Lanius*, and again under *Muscicapa*, but both times with the same specific title, *emeria*.]

\*468. *PYCNONOTUS HÆMORRHOUS* (J. 462).

*Turdus cafer*, Gm., founded on *Merle huppé du Cap de bonne espérance*, P. E. 563, fig. 1.

Specimens from Arakan and South India appear to me to be undistinguishable, although the larger and much blacker *P. pygæus* takes its place in Lower Bengal.

[Thayet Myo, Tonghoo, Rangoon (*W. R.*). Rangoon examples more properly fall under the race named *pygæus* by Hodgson. This appropriate title, which had been adopted by Jerdon, Blyth, and other accurate authors, was changed, through misprint or other error, in the Hand-List, No. 3957, to the inappropriate title of *pygmæus*. *H. pusillus*, Blyth, founded on the South Indian bird, is a synonym of true *P. hæmorrhous*.]

469. *P. NIGRIPILEUS*.

*P. nigropileus*, nobis, J. A. S. B. xvi. p. 472.

Tenasserim provinces. Common. Another representative race of the preceding, which again only differs from *P. crocorrhous*, Strickland, of Java, in having the lower tail-coverts crimson.\*

[Tonghoo, Karen hills (*W. R.*); Moulmein, Amherst (*D.*).]

\* *P. xanthorrhous*, J. Anderson (P. A. S. B. 1869, p. 265; *P. andersoni*, Swinhoe), is a species described from Yunan and from the Ichang gorge of the Upper Yang-tze.



[470. *P. atricapillus*.

*Muscicapa atricapilla*, Vieill. N. Dict. 21, p. 489 (1818); A. Hay, M. J. L. Sc. xiii. p. 160; Ibis, 1866, p. 318.

*Hamatornis chrysorrhoides*, Lafr., Rev. Zool. 1845, p. 367.

Karen nee, from 1000 to 2000 feet (*W. R.*); Pahpoon, Meeta Myo hills, Tavoy (*D.*).]

\*471. *RUBIGULA FLAVIVENTRIS* (J. 456).

Arakan, Tenasserim, Siam. Common.

[Rangoon, Tonghoo, Karen nee (*W. R.*).]

\*472. *BRACHYPODIUS MELANOCEPHALUS*.

*Lanius melanocephalus*, Gm.; *Turdus atriceps*, Tem., P.C. 147. *Bok-ica*.

Tippera, Arakan, Tenasserim provinces, Malacca, Sumatra. Dr. Stoliczka remarks that he has seen this species "darting after insects almost like a Flycatcher."

[Karen nee (*W. R.*).]

[473. *B. CINEREIVENTRIS*.

*B. cinereiventris*, Blyth, J. A. S. B. 1845, p. 576.

Tonghoo (*W. R.*). I have great doubts whether this is a species distinct from *B. melanocephalus*. It seems to be rather a variety, the yellow of the nape and under surface being changed to grey. A Malaccan example in my collection is in a stage of transition from yellow to grey. Where not grey, these examples do not differ from *B. melanocephalus*. Mr. Blyth describes (*l. c.*) "the tail-feathers as being less deeply tipped with yellow," etc., but the rectrices in these two examples are identical with those of Malaccan and Burman specimens of *B. melanocephalus*. In Sumatran *Ixus chalccephalus* all the yellow plumage of *B. melanocephalus* is changed to grey, the black and metallic parts only remaining the same in the two forms. Whether it be considered as a distinct species or not, *B. cinereiventris* is an interesting example of an "incipient" species.]

Subfam. PHYLLORNITHINÆ (Hurriahs).

474. *PHYLLORNIS JAVENSIS*.

*Meliphaga javensis*, Horsfield; *Chloropsis sonnerattii*, Jard. and Selby, Ill. Orn. pl. 100; Gould, B. As. pt. xiii. pl. 6.

This Malayan species was obtained on Moulè-it mountain by Col. Tickell.\*

[Ye (*D.*).]

\* J. A. S. B. xxiv, p. 277.



\*475. *P. HODGSONI* (J. 465).

*P. hodgsoni*, Gould, B. As. pt. xiii. pl. 8. *Hynet-seing* (generic).

Arakan; also obtained by Mr. W. T. Blanford seventy miles above Ava.\*

[Rangoon, Tonghoo, Yey-tho, Thayet Myo, Karen nee (*W. R.*). The continental species seems to have been separated from the Sumatran, on insufficient evidence. The Malaccan form is considerably smaller.]

\*476. *P. CHLOROCEPHALUS*.

*P. chlorocephalus*, Walden, Ann. M. N. H. (4), 1871, vol. vii. 241; *Turdus cochinchinensis*, Gm. (?).

Arakan, Tenasserim; has been obtained also on the Garo hills.

[Tonghoo, Karen nee, at 1600 feet (*W. R.*).]

\*477. *P. HARDWICKII* (J. 466).

*Chloropsis hardwickii*, Jard. and Selby; Gould, B. As. pt. xiii. pl. 7.

Arakan, Tenasserim mountains. *P. lazulina*, Swinhoe, of Hainan, is barely separable.

[Tonghoo hills, Karen hills, from 3500 to 4000 feet (*W. R.*). *P. lazulina* has the shoulder patch coloured like the moustache, and the crown cinereous green.]

\*478. *IORA LAFRESNAYII*.

*Iora lafresnayii*, Hartlaub, Rev. Zool. 1844, p. 401; Mag. de Zool. 1845, t. 60; Stoliczka, J. A. S. B. xxxix. pt. ii. p. 309; ♀ *I. innotata*, nobis, J. A. S. B. xvi. p. 472.

Arakan, Malacca. Apparently of rare occurrence.

[*Phenicomanes iora*, Sharpe, P. Z. S. 1874, p. 427, pl. 54, is synonymous. As long since pointed out (*Ibis*, 1866, p. 317), if *Sylvia leucoptera*, Vieill., is a species of *Iora*, and there can be but little doubt that it is, Vieillot's generic title of *Ægithina* must supersede Horsfield's.]

\*479. *I. TYPHIA* (J. 468).

*I. typhia*, *Ibis*, 1867, p. 10.

Indo-Chinese countries generally, Malayan peninsula, Sumatra, Java, and Borneo. Throughout this range of distribution it never shows the black upper parts of *I. zeylonica*, but there co-exists with it in the Malay countries, the *I. scapularis*, Horsfield, the male of which is *I. viridissima*, Temminck.

[Rangoon, Tonghoo, Karen nee (*W. R.*). Javan *I. scapularis*, ♀, is certainly not separable from *I. typhia*, ♀; the bill however is shorter. *I.*

\* J. A. S. B. xxxii. p. 79.



*viridissima* is not the male of *I. scapularis*. *I. viridis*, Bp., may be the male of *I. scapularis*, but then it is difficult to separate *I. viridis* from *I. typhia*. *I. viridis*, described from Bornean examples, occurs also at Malacca, and is the species referred to above as the *I. typhia* of those countries. It is certainly of a much deeper yellow underneath than *I. typhia* of India and Burma, having the chin, cheeks, throat, breast, and under tail-coverts intense golden, much deeper than in *I. zeylonica* in full plumage, and it is but little less brilliant in the female. The bill, too, is somewhat stouter than in *I. typhia*, and much more so than in Javan *I. scapularis*, a character also relied on by Bonaparte. As it is possible that *I. typhia* does sometimes assume this rich golden colour, although in the many individuals I have examined I have never met with one, *I. viridis* had better, for the present, remain a synonym of *I. typhia*. Of the males, one Tonghoo example (April 19) has the interscapular region black. Another (April 15) has the entire head and nape black. A Rangoon individual (June 6) has the occiput and nape black, forehead mixed black and green, some interscapulars turning to black, or reverting to green. All the rest (a large series) green above. A Karen nee male, in otherwise typical plumage, has the middle pair of rectrices broadly tipped (quarter of an inch) with green, remainder very narrowly tipped with green, outer pair fringed on inner and outer margins, and tipped with the same colour. This example has the chin, cheeks, throat, and breast very deep yellow, but not golden, as in *I. viridis*. The mutations, both in colouring and markings, which exhibit themselves in all the members of this genus, have been too little studied and are too little known to entitle any one at present to pronounce dogmatically on the subject. The problem is a much deeper one than whether *I. zeylonica* and *I. typhia* are to stand in our lists as titles representing one species or two distinct species. The admitted fact that the occurrence of birds in the *I. zeylonica* garb are exceptional in Burma and the rule in Ceylon and peninsular India, whereas breeding males are rarely (as yet recorded) found in Ceylon and peninsular India in *I. typhia* plumage, is one that cannot be disposed of or accounted for by a mere dogmatic assertion that all belong to one species. Cf. Captain Cock (Hume, Nests and Eggs, p. 297).]

Subfam. IRENINÆ (Irenas).

\*480. IRENA PUELLA (J. 469).

*Coracias puella*, Lath.; nec *Muscicapa cyanea*, Bebbio, v. *Irena malayensis*, Moore; cf. Viscount Walden, Ann. M. N. H. (4), v. p. 417; J. A. S. B. xxviii. p. 274.

Arakan, Tenasserim.

[Tonghoo, Karen hills (W. R.); Thayet Myo (O.). The *Irena* of the





Karen hills very closely resembles the Malabar bird; the colour of the males is however perhaps a shade lighter, approaching more nearly to *I. cyanea*.]

## Fam. Oriolidæ.

## Orioles.

## \*481. PSAROPHOLUS TRAILLII (J. 474).

*Pastor traillii*, Vigors; Gould, B. As. pt. xxiii. pl. 5.

Arakan, Tenasserim. A mountain species, inhabiting the more elevated forests. In Hainan and Formosa it is represented by *P. ardens*, Swinhoe, as in Java by *O. sanguinolentus*, Tem.

[Tonghoo, Karen hills, Karen nee (*W. R.*). Swainson's generic title, *Analcipus*, has precedence. The oldest title for the Javan species is *cruentus*, Wagler.]

## \*482. ORIOLUS MELANOCEPHALUS (J. 472).

*Loriot de la Chine*, P.E. 79.

Arakan, Tenasserim provinces, Malayan peninsula.

[Tonghoo, Yey-tho, Thayet Myo, Karen nee (*W. R.*).]

## \*483. O. INDICUS (J. 471).

*O. indicus*, Jerdon, Ill. Orn. pl. 15.

Arakan, Tenasserim, China, Java. The *Couliavan* of Buffon, P. E. 570, upon which is founded *O. chinensis*, L., does not represent this species, but *O. acrorhynchus*, Vigors, which appears to be peculiar to the Philippines.

[Rangoon (*W. R.*). The Rangoon individuals, all in perfect plumage, cannot be separated from China examples. They must therefore take the title of *O. chinensis*. The title of *O. hippocrepis*, Wagler, cannot be used for any species of *Oriole*, as it was applied to Indian, China, CochinChina, Javan, and Sumatran examples generally, and, moreover, included the Philippine *O. acrorhynchus*. D'Aubenton's plate, above alluded to (P. E. 570), the subject of which may have been described by Montbeillard, not Buffon (Hist. Nat. Ois. iii. p. 262), certainly agrees best with *O. acrorhynchus*, Vigors. But Linnæus founded no title on it. Montbeillard identified, by reference, his *Coulavan* with Brisson's *O. cochinsinensis*, described from individuals obtained in CochinChina by Poivre, and brought by him to Reaumur. On Brisson's species *O. chinensis*, Lin., was founded, but the description in the "Ornithologia" applies better to the Chinese bird than to the Philippine.]



\*484. *O. TENUIROSTRIS.**O. tenuirostris*, nobis, J. A. S. B. xv. 48.

Arakan, Pegu, Martaban. Apparently not common, and distinguished from the preceding species by having a much more slender bill.

[Tonghoo (*L.*); Thayet Myo, Karen nee (*W. R.*); Kollidoo (*D.*).]

## Fam. Nectarinidæ.

## Sunbirds.

\*485. *ARACHNOTHERA MAGNA* (J. 223).

Arakan, Tenasserim.

\*486. *A. AURATA.**A. aurata*, nobis, J. A. S. B. xxviii. p. 416.

Tonghoo.

[Karen hills, at 2500 feet (*W. R.*). Jerdon (B. Ind. i. p. 361) refers to an *Arachnothera phayrei*, Blyth, from Pegu. I cannot find that Blyth ever published any such title. Jerdon states that *A. phayrei* is very close to *A. magna*. *A. aurata* is noted in my private memoranda (written some years ago) on Jerdon's work, as being intended: a correction almost certainly entered, as in many other instances, after personal reference to Blyth or Jerdon, although the circumstance has escaped my memory. There is a *Nectarinia phayrei*, Blyth, a title Jerdon may have had in his mind. As Blyth does not include *A. phayrei* in this list, it is most probable that he never published such a title, and that it occurs (*l. c.*) through a slip of the pen.]

\*487. *A. FUSILLA* (J. 224).

Tippera, Arakan, Tenasserim, Pinang, Malacca, Sumatra.

[Tonghoo (*W. R.*). This species must take the specific title of *longirostra*, Lath., Ind. Orn. i. p. 299. One Tonghoo example, shot in April, has the orange pectoral tufts fully developed; while in another (♂), obtained on the 20th of that month, they are absent. Javan individuals can hardly be separated.]

[488. *A. MODESTA.**Anthreptes modesta*, Eyton, P. Z. S. 1839, p. 105.

Meeta Myo (*D.*). Thus identified by Mr. Hume.]



\*489. *ARACHNECHTHRA ASIATICA* (J. 234).

*Certhia asiatica*, Latham; Ibis, 1870, p. 20; *A. intermedia* (F), A. O. Hume, Ibis, 1870, p. 436, from Tippera.

Arakan, "Thayet Myo, Yen-an-khyoung" (*Blanford*). *A. intermedia* is described to have the bill of intermediate length to those of *A. asiatica* and *A. lotenia*; but neither Mr. W. T. Blanford nor myself distinguished the more eastern form from that common in North India.

[Tonghoo, Thayet Myo, Karen nee (*W. R.*); general, north of Ye (*D.*). *A. intermedia* cannot claim specific rank.]

\*490. *A. FLAMMAXILLARIS*.

*Nectarinia flammaxillaris*, nobis; Ibis, 1870, p. 24.

Arakan, Tenasserim, Pinang, Siam, South China (?).

[Rangoon, Yey-tho (*W. R.*).]

\*491. *ÆTHOPYGA MILES* (J. 225).

*Cinnyris miles*, Hodgs.; Ibis, 1870, p. 32.

Viscount Walden remarks that Moulmein and Tippera specimens in his collection are smaller than those from the Deyra Doon and from Nipâl. "From Tippera, wing 2·12, tail 2·72, bill ·57; from the Deyra Doon, wing 2·18, tail 3·18, bill 6. The Moulmein specimen is still smaller."

[Tonghoo (*L.*). Some five years ago I pointed out (*l.c.*) that Moulmein and Tippera specimens differed from Deyra Doon and Nipaul individuals, but I refrained from separating the former specifically until the variations that *Æ. miles* undergoes had been investigated. While identifying the Tenasserim race (south of Moulmein) with *N. lathami*, Jard., Mr. Hume (*Str. Feath.* ii. p. 473, note) has bestowed on it the specific title of *cara*. The Tenasserim and Tonghoo race does slightly differ from true *Æ. miles*, but it certainly is not *Æ. lathami*, which is described as having a blue front and upper tail-coverts, and black interior maxillary stripes. There can be little doubt that *N. lathami* is=*Æ. eupogon*.]

\*492. *Æ. GOULDIE* (J. 227).

*Cinnyris gouldie*, Vigors; Ibis, 1870, p. 35.

Mountains of Arakan, where probably also occur *Æ. nipalensis*, *Æ. saturata*, and *Æ. ignicauda*, all of which inhabit the Khásias.

[493. *Æ. DEBRII*.

*Nectarinia debryi*, G. Verr., R. M. Zool. 1867, pl. 15; Walden, Ibis, 1870, p. 35.

Karen nee, at 4000 feet. Iris (♂), bill, and legs, brown (*W. R.*). A





representative form of *Æ. gouldiæ*, from which it only differs by having the breast vermilion.]

[494. *Æ. SANGUINIPECTUS*.

*Æ. sanguinipectus*, Walden, Ann. M. N. H. (4), 15, p. 400 (1st June, 1875).

Karen nee hills, at from 2500 to 3000 feet (*W. R.*).]

\*495. *NECTAROPHILA HASSELTII*.

*Nectarinia hasseltii*, Tem.; *Certhia brasiliensis*, Gm.; Ibis, 1870, p. 41.

Tippera, Arakan, Tenasserim, Pinang, Malacca, Sumatra, Borneo.

\*496. *ANTHOTHREPTUS MALACCENSIS*.

*Certhia malaccensis*, Scopoli; Ibis, 1870, p. 47.

Arakan, Tenasserim, Siam, Cambodia, Malacca, Sumatra, Java, Borneo, Celebes, and Sula Islands, but "does not reach the Moluccas" (*Wallace*).

\*497. *CHALCOPARIA PHÆNICOTIS*.

*Nectarinia phænicotis*, Tem.; *Certhia singalensis*, Gmelin; Ibis, 1870, p. 48.

Tippera, Arakan, Tenasserim, Siam, Malacca, Sumatra, Java, Borneo.

[Rangoon, Tonghoo (*W. R.*).]

\*498. *DICÆUM CRUENTATUM* (J. 236).

*Certhia cruentata*, Lin.; Gould, B. As. part vi. pl. —

Arakan, Tenasserim, Pinang, Malacca, Sumatra, Borneo. Very abundant in the vicinity of Mergui station.

[Rangoon, Yey-tho, Tonghoo (*W. R.*); Thayet Myo (*F.*). The race which inhabits Sarawak has been specifically separated by Count Salvadori under the title of *D. nigri-mentum* (Ucc. Borneo, p. 165). Malaccan individuals appear also to differ, although but slightly, from Burman, Bengal, and Assam examples.]

\*499. *D. TRIGONOSTIGMA*.

*Certhia trigonostigma*, Scopoli; *C. cantillans*, Latham (cf. Stoliczka, J. A. S. B. xxxix. pt. 2, p. 303).

Arakan, Tenasserim, Malacca, Sumatra, Borneo.

[Karen hills, at 3000 feet (*W. R.*).]

\*500. *D. CHRYSORRHÆUM* (J. 237).

Khásias, Arakan, Tenasserim, Malacca.

[Tonghoo. Iris (♂, ♀), brown; bill, black; legs, dark slate-colour (*W. R.*).]



\*501. *D. ERYTHORHYNCHA* (J. 238).*Certhia erythrorhyncha*, Latham, Ind. Orn. i. p. 299; *Nectarinia minima*, Tickell.

Latham's title was founded on the drawing of a young specimen, with the colour of the bill exaggerated. A still smaller species from Hainan has been described as *D. minullum*, Swinhoe, Ibis, 1870, p. 240.

Arakan, Tenasserim. Exceedingly abundant in the jungles near Moulmein, and coming within reach of the hand if the spectator remains motionless.

[There is nothing in Latham's text to indicate that he described from a drawing.]

[502. *D. VIRESCENS*.*D. virescens*, Hume, Str. Feath. ii. p. 198.

Pahpoon and neighbourhood (*D.*.)]

[503. *D. OLIVACEUM*.*D. olivaceum*, Walden, Ann. M. N. H. (4), 15, p. 401 (June 1st, 1875).

Tonghoo hills, Karen hills (*W. R.*.)]

[504. *MYZANTHE IGNIPECTUS* (J. 241).

Karen nee, at 4000 feet (*W. R.*.)]

## Order GEMITORES.

Pigeons.

Fam. *Treronidæ*.

Hurrials.

\*505. *TORIA NIPALENSIS* (J. 771).

Not uncommon in Arakan; occurs also in the Malayan peninsula, and in Sumatra.

[Pegu hills (*O.*); Tenasserim (*D.*). The generic title, *Toria*, must give way to *Treron*. The species seems to be identical with *T. nasica*; if so, its range extends to Borneo.]

\*506. *CROCOPUS VIRIDIFRONS*.*Treron viridifrons*, nobis, J. A. S. B. xiv. p. 849; Bonap., Icon. des Pigeons, pl. 9.

Pegu, Tenasserim provinces, Siam. This race is barely separable from *C. phænicopterus*, but its colours are always purer and more strongly contrasted. Mr. W. T. Blanford, however, gives *C. phænicopterus* from Ava, in addition to *C. viridifrons* from Bassein and Thayet Myo.\*

[Tonghoo (*W. R.*.)]

\* Ibis, 1870, p. 469.



\*507. *OSMOTRERON PHAYREI* (J. 776).

Common in Arakan and Pegu, rare in Lower Bengal. In colour it quite resembles *Toria nipalensis*, but the bill is very differently shaped.

[Tonghoo (*W. R.*); Tenasserim (*D.*).]

\*508. *O. BICINCTA* (J. 774).

Arakan, Pegu, Tenasserim provinces, Siam, Malacca (*fide* Walden) and India generally. A slightly different race inhabits Hainan (*O. domvillei*, Swinhoe).<sup>\*</sup> From Siam Mr. Gould notes the allied *T. viridis* (Scopoli) = *vernans*, Lin., in addition to *O. bicincta*. *O. viridis* is a common Malayan species, which is likely to occur in South Tenasserim.

[Tonghoo (*W. R.*). The common Malayan species alluded to is *Columba vernans*, Lin. Mr. Hume notes it from Tenasserim (*Str. Feath.* i. p. 461, and iii. p. 162), but does not include it in his list of Tenasserim birds (*op. cit.* ii. p. 481.)]

[509. *SPHENOCERCUS SPHENURUS* (J. 778).

[Tonghoo hills (*W. R.*); hills north of Pahpoon (*D.*).]

[510. *S. APICAUDUS* (J. 779).

Tonghoo hills (*W. R.*); hills north of Pahpoon (*D.*).]

Fam. **Columbidae.**

## Pigeons and Doves.

## Subfam. CARPOPHAGINÆ (Fruit Pigeons).

\*511. *CARPOPHAGA INSIGNIS* (J. 781).

Mountains of Arakan.†

In the Leyden Museum I remarked that *C. insignis* (Hodgson) appeared to be the same as *C. badia* (Raffles), the former being rather brighter in colouring; while *C. lacernulata* (Tem.), of Sumatra and Java, is rather smaller with a distinct grey cap.

[*C. lacernulata* is, as yet, only with certainty recorded as an habitant of Java.]

\*512. *C. AENEÆ* (J. 780).

*Bung-madie.*

Generally diffused over British Burma, and identical with the species as found in Central India and in the Andaman Islands; while the correspond-

\* *Ibis*, 1870, p. 534.

† *cf.* J. A. S. B. xxviii. p. 416.





ing bird of the Nicobars (*C. insularis*, nobis\*) is constantly distinguishable. *C. rosacea* (Tem.), from Timor, etc., differs very slightly. In Southern India and Ceylon the race is smaller, but otherwise similar (*C. pusilla*, nobis†). Of this small race I observed four specimens from Travancore and Ceylon in the Museum at Leyden.

[Tonghoo (*L.*).]

513. *C. BICOLOR.*

*Columba bicolor*, Scopoli; Sonnerat, Voy. t. 103; *C. alba*, Gmelin; *C. littoralis*, Tem. Mergui archipelago, Nicobar Islands, Malayan peninsula.

Subfam. COLUMBINÆ (Pigeons).

514. *ALSOCOMUS FUNICEUS* (J. 782).

Arakan, Tenasserim, not uncommon on Ramri Island; Central India, Ceylon. It is nearly allied to *Columba ianthina*;‡ and an unnamed species of the *Palumbus* or *Cushat* group from Siam (*Xiengmai*) would seem to be indicated by the late Sir R. H. Schomburgk.§

[Tonghoo (*W. R.*). The examples constituting the large series obtained at Tonghoo by Lieutenant W. Ramsay in no way differ from Maunbhoom and Upper Assam individuals.]

\*515. *COLUMBA LIVIA* (J. 788).

*Columba livia*, var. *intermedia*, Strickland; *C. turricola*, Bonap.

Common, as throughout India, and only differing from the wild European *livia* in having no white above the tail. It everywhere grades into the domestic Pigeon.

\*516. *TURTUR TRANQUEBARICUS* (J. 797).

*Turtur tranquebaricus*, Hermand, Obs. Zool. p. 200. *Gyo* (generic).

Arakan.

[Karen nee (*W. R.*). The Karen nee examples belong to true *T. humilis* of the Philippines, and not to *T. tranquebaricus*.]

\*517. *T. TIGRINUS.*

*Columba tigrina*, Tem.; Knip, Fig. pl. 43.

Indo-Chinese and Malayan countries. This can hardly be considered as

\* J. A. S. B. xv. p. 371.

† Fauna Japonica, Aves, t. lx. c.

+ *op. cit.* xviii. p. 816.

‡ Ibis, 1864, p. 250.





being other than a race of *T. suratensis*, of India with Ceylon, but, except where the two come in contact, the difference would seem to be maintained.

[Yey-tho, Thayet Myo (*W. R.*). Mr. Hume, *Str. Feath.* iii. p. 164) speaks of "typical *tigrina* from Sumatra." As the species, *T. tigrinus*, was not described from a Sumatran individual, it is difficult to gather what is meant by the expression "typical."]

\*518. *T. MEENA* (J. 793).

*Gyo-peing-tu-ma.*

Arakan, Tenasserim. A specimen of *T. cambaiensis* flew on board a steamer when in sight of land on the voyage from Moulmein to Rangoon.\*

[Tonghoo, Karen nee, at 4000 feet (*W. R.*).]

[519. *T. RISORIUS* (J. 796).

Thayet Myo (*F.*). Professor Schlegel (*Mus. P.-Bas, Columbae*, p. 123) adopts the title of *T. douraca*, Hodgs., for this Indian dove, and restricts the Linnæan title to the domestic bird of Europe (*l. c.* p. 125). But all the authors Linnæus quotes described the bird from India. It is the *Turtur indicus* of Aldrovandi, and Linnæus says "*habitat in India.*" ]

520. *MACROPYGIA RUFICEPS.*

*Columba ruficeps*, Tem.; P.C. 561.

Mergui, Province Wellesley, Java. A finer species akin to this inhabits the Andaman and Nicobar Islands, *M. rufipennis*, nobis;† and the *M. tusalia* is likely to occur on the higher mountains of Arakan, if not further south; it is not rare on the Khásias, and a smaller race of the same is described from Hainan.‡

[This Javan species may occur as stated, but the following appears to be the commoner form.]

[521. *M. ASSIMILIS.*

*M. assimilis*, Hume, *Str. Feath.* ii. p. 441.

Karen hills, at 3000 feet. Iris (♀), grey; bill and legs, vinous brown (*W. R.*); Kollidoo (*D.*).]

[522. *M. TUSALIA* (J. 791).

Karen nee (*W. R.*); Kollidoo (*D.*).]

\* Beavan, *Ibis*, 1869, p. 406.

† J. A. S. B. xv. p. 371.

‡ *Ibis*, 1870, p. 355.



\*523. *CHALCOPHAPS INDICUS* (J. 798).

India, Indo-China, and Malay countries, Andaman Islands; but the Nicobar race\* is a little peculiar, and corresponds with *C. mariæ*, Bonap.

[Rangoon, Tonghoo, foot of Karen hills (*W. R.*); Tenasserim (*D.*). Recent investigations do not confirm the opinion that the Nicobar race of this species differs.]

Subfam. *CALCENINÆ* (Hackled Ground-Pigeons).

524. *CALCENAS NICOBARICUS*.

*Columba nicobarica*, Lin.; Edwards, pl. 339; Pl. Enl. 491.

This remarkable bird is common in the Mergui archipelago, and I have received the young from the Cocos Islets, north of the Andamans. It seems to be only able to maintain itself in islands where there are no small carnivorous mammalia; and I doubt, therefore, the statement that it is "common on the Tenasserim coast."†

## Order GALLINACEÆ.

Poultry-Birds.

Fam. *Pavonidæ*.

Pheasants, etc.

Subfam. *PAVONINÆ* (Peafowl).

\*525. *PAVO MUTICUS*.

*Pavo muticus*, L. *Oo-doung*. Elliot, Mon. Phas. pt. ii. pl. 11.

Chittagong, Arakan, Tenasserim, Siam. Invariably of darker and less vivid colouring than the species as it occurs in Java, but not otherwise differing. In the provinces of Sylhet and Assam the Indian species, *P. cristatus*, replaces it.‡

It is doubtful, at present, whether this species really inhabits the Malayan peninsula or Sumatra; but Crawford distinctly asserts that it inhabits "the tropical countries lying between India and China,—of the Malayan peninsula, and the islands of Sumatra and Java."§ On the other hand, Wallace remarks that "it is a singular fact in geographical distribution that the Peacock should not be found in Sumatra or Borneo, while the superb

\* J. A. S. B. xv. p. 371.

† Calc. J. N. H. ii. p. 144.

‡ Calc. J. N. H. i. p. 605.

§ Tr. Ethn. Soc. n.s. vol. ii. p. 451.



Argus, fire-backed, and ocellated Pheasants of those islands are equally unknown in Java.\* Raffles must mean this species when he states that "the common Peacock is a native of the Malayan peninsula and of Java, and is also known to Sumatra." He gives the Malayan name as *M'ree* or *Marak*, but in Sumatra he may only have seen tame Peafowl, imported from Java. The late Dr. Cantor had specimens in his collection from Pinang and Province Wellesley, but whether procured there in the wild state I am unaware; it may be remarked, however, that the same collection contained specimens of *Gallus varius*, which is understood to be quite peculiar to Java.

[The occurrence of this species in Burma offers a notable instance of the fact that Javan forms, unknown in the Malay peninsula south of Pinang, and in Sumatra and Borneo, reappear in Burma.]

Subfam. ARGUSANINÆ.

526. ARGUSANUS GIGANTEUS.

*Phasianus argus*, L.; Elliot, Mon. Phas. pt. iii. pl. 2.

Mergui, Malayan peninsula, Sumatra.

\*527. POLYPLECTRON CHINQUIS.

*Polyplectron chinquis*, Temminck; *Pavo tibetanus*, L.; Gould, B. As. pt. xxiii. fig. 1; Elliot, Mon. Phas. pt. ii. pl. 8. *Doung-Kula*, *Monucur*, and *Day-o-da-huk*.

Sylhet, Assam, Tenasserim provinces; South-West China (*Suinhoo*).

[The oldest name for this species is *P. tibetanus*, but as it involves a geographical error, Temminck's title is adopted by most authors.]

Subfam. PHASIANINÆ (Pheasants).

528. GALLUS FERRUGINEUS (J. 812).

*Tetrao ferrugineus*, Gm.; Elliot, Mon. Phas. pt. ii. pl. 9.

The wild common Fowl. Abundant in the forests, and the domestic poultry of the Karéns is commonly recruited from the wild race, which is not the case in those parts of northern and central India where the wild and tame inhabit the same forest districts. The cheek-lappet of the cock is pure white and contrasting in the Indian race, and red in the Indo-Chinese race. The tarsi are always slate-coloured in the wild bird, but tend to become yellow in the domestic before any other change is perceptible.

[Tonghoo (*W. R.*); Tenasserim (*D.*).]

\* Malay Archipelago, i. p. 169.



\*529. *NYCTHEMERUS LINEATUS*.

*Phasianus lineatus*, Latham; *P. reynaudii*, Lesson; *P. fasciatus*, McClelland; Elliot, Mon. Phas. pt. iii. pl. 7. *Yect.*

Pegu, Martaban, Tenasserim. Common down to the sea-level or nearly so. In Arakan the race is hybrid (*Lophophorus cucieri*),\* and presents every gradation from *N. lineatus* to *G. horsfieldi*† of Tippera and Sylhet.‡

[Karen hills (*W. R.*). Wagler's generic title *Gennæus* has precedence.]

530. *N. ANDERSONI*.

*Euplocamus andersoni*, Elliot, P. Z. S. 1871, p. 137; Mon. Phas. pt. v. pl. 11.

This fine species, intermediate to *N. lineatus* and the well-known Silver Pheasant, *N. argentatus*, Swainson,§ was discovered by Dr. J. Anderson in Yunan.

Another beautiful species, *Diardigallus prælatus*, Bonap.,|| inhabits the Shan States, and is now bred in European *vicaria*. According to M. Germain, this bird is common through the forest region of French Cochin-China.

In the Yunan mountains the superb Lady Amherst Pheasant¶ was obtained by Dr. J. Anderson.

[The oldest published title with a description for *D. prælatus*, is *cräufurdii*, J. E. Gray (Cuv. R. An. (Griffith), *Aves*, iii. p. 27). Mr. Craufurd brought the type (♀) from Ava, but we have no evidence that the species is indigenous to Burma, and it is therefore not here included.]

531. *EUPLOCOMUS IGNITUS*.

*Phasianus ignitus*, Latham; *E. vieillotti*, Gray; Gould, B. As. pt. ii. pl. 8; Elliot, Mon. Phas. pt. ii. pl. 10.

This large Malayan Pheasant is common along the valley of the great Tenasserim river. Kachar.

## Subfam. PERDICINÆ (Partridges).

\*532. *FRANCOLINUS PHAYREI*.

*Francolinus phayrei*, nobis, J. A. S. B. xii. p. 1011; xxiv. p. 480.

Common in Pegu, and a young example is contained in the British Museum from Cochin-China. Very similar to *F. sinensis* (*Tetrao chinensis*,

\* Tem., P.C. v. pl. 1.

† Elliot, Mon. Phas. pt. iv. pl. 4.

‡ *vide* J. A. S. B. xviii. p. 817.

§ Elliot, Mon. Phas. pt. i. pl. 6.

|| *Phasianus cräufurdii* (♀), Gray, ♀; Gould, B. As. pt. xi. pl. 4; Elliot, Mon. Phas. pt. i. pl. 12.

¶ *Thaumalea amherstiae*, Gould, B. As. pt. xviii. pl. 7; Elliot, Mon. Phas. pt. ii. pl. 10.



Osbeck, *T. perlatus*, Gmelin), but less robust, having the bill and feet more slender. In Hainan the species is described as identical with that of South China. Sir. R. H. Schomburgk's *F. pictus* from Siam is doubtless the present species.

[Thayet Myo, Karen nee (*W. R.*). The slight differences between the Burman and Chinese races of this Francolin, relied on by Mr. Blyth, seem hardly sufficient to constitute a separate species. A comparison made between numerous examples from Burma and China disinclines me to concur in Mr. Blyth's opinion.]

533. *ARBORICOLA RUFIGULARIS* (J. 825).

This species of Peura Partridge, which inhabits the South-East Himalaya, at a lower altitude than *A. torqueola*, was obtained by Colonel Tickell in the mountainous interior of the Tenasserim provinces, at elevations of from 3000 to 5000 feet.

\*534. *A. INTERMEDIA*.

*A. intermedia*, nobis, J. A. S. B. xxiv. p. 277.

I failed to discriminate these two races, until I had received numerous living examples of *A. atrigularis* from Sylhet, when I remarked the difference of *A. intermedia*, which I have reason to suspect was received from Arakan. There is a specimen of the latter in the British Museum, habitat unknown. (Since the above was written, Mr. W. T. Blanford has obtained *A. intermedia* from Arakan.)

535. *A. BRUNNEIPECTUS*.

*A. brunneipectus*, Tickell, J. A. S. B. xxiv. p. 276.

Tenasserim mountains, from 3000 to 5000 feet (*Tickell*).

[Tonghoo and Karen hills (*W. R.*).]

536. *A. CHLOROPUS*.

*A. chloropus*, Tickell, J. A. S. B. xviii. pp. 415, 453.

"Tolerably numerous; but as far as my observations go, is entirely confined to the forests on the banks of the Zummee river. Unlike its known congeners, it avoids mountains, and inhabits low though not humid jungles, where the ground merely undulates or rises into hillocks. Early in the morning these birds come out on the pathway, scratching about in the elephants' dung, and turning over the dead leaves for insects. They do not appear to have any crow or call, though during the pairing season this may not be the case" (*Tickell*). This species is nearly allied to *A. charltoni*





(Eyton), *A. pyrrhogaster* (Reichenbach) of Province Wellesley, but is sufficiently distinguished.

[Eastern slopes of the Pegu hills (*O.*).]

537. *CALOPERDIX OCELLATA.*

*Tetrao ocellatus*, Raffles, Tr. L. S. xiii. p. 322; *Perdix ocellus*, Tem.; Hardw. Ill. Zool. i. pl. 58.

Obtained by Major Berdmore in Mergui province. *Hab.* also Province Wellesley and Sumatra.

[Temminck's specific title has precedence.]

538. *BAMBUSICOLA FYTCHEI.*

*Bambusicola fytchei*, J. Anderson, P. Z. S. 1871, p. 214, pl. xi.

Was obtained on the hill-sides of Pongsee, at an elevation of 3000 feet.

539. *ROLLULUS CRISTATUS.*

*Columba cristata*, Gmelin; *Perdix coronata*, Latham.

Valley of the Tenasserim river, Siam, Malayan peninsula, Sumatra, and Borneo. "More common about Malacca than in the Wellesley Province and in Tenasserim" (*Stoliczka*).

[Must stand as *Rollulus roulroul*.]

\*540. *COTURNIX COMMUNIS* (J. 829).

Arakan, Martaban.

[Karen nee (*W. R.*).]

541. *C. COROMANDELICUS* (J. 830).

Common in Upper Burma.

542. *EXCALFACTORIA CHINENSIS* (J. 831).

*Tetrao chinensis*, Lin.; Gould, B. As. pt. x. pl. 12.

Arakan, Tenasserim, Malayan peninsula and islands.

*Fam. Turnicidæ.*

Hemipodes.

543. *TURNIX BLANFORDI.*

*Turnix blanfordi*, nobis, J. A. S. B. xxxii. p. 80; *Hemipodius maculosus*, Tem. (f); *Turnix maculatus*, Vieillot, Gal. des Oiseaux, t. 217.

Arakan, Pegu.\*

[Tonghoo, Karen nee (*W. R.*); Kollidoo (*D.*). Not to be separated from Shanghai and Chefoo examples.]

\* *vide* Swinhoe, in P. Z. S. 1871, p. 402.





544. *T. PLUMBIPES* (J. 833).

*T. plumipes*, Hodgson, Beng. Sport. Mag. 1837, p. 345.

Tenasserim specimens are quite similar to those from Nipál.

[Thayet Myo, Karen nee, Tonghoo (*W. R.*). Not separable from Malaccan examples; but differing somewhat from Javan *T. pugnax*.]

## Order GRALLATORES.

### Waders.

N.B.—Bustards are foreign to the Indo-Chinese countries, but a straggler of the Likh Florikim (*Sypheotides aurita*) is recorded to have been shot at Sandoway, Arakan (Bengal Sport. Mag. 1835, p. 151).

### Tribe LIMICOLÆ (Plovers and Snipes).

#### *Fam. Charadriadæ.*

#### Plovers.

\*545. *AESACUS RECURVIROSTRIS* (J. 858).

Common along the banks of rivers.

[Kyasoo creek (*W. R.*).]

546. *OEDICNEMUS CREPITANS* (J. 859).

Yenan-khyoung (*W. H. Blanford*).

547. *CHLETTUSIA CINEREA* (J. 854).

Bassein, China and Japan.\*

[Tonghoo (*W. R.*); Ye (*D.*). As Professor Schlegel (*l. c.*) gives Mr. Blyth's title precedence, it may be accepted for the present. Further investigation may, however, show that Temminck and Schlegel's title was published at an earlier date. The Report in which Mr. Blyth first described *C. cinerea* was for March, 1842, but was only actually published with the Proceedings of the A. S. B. for June, 1842.]

\*548. *SARCOGRAMMA ATRINUCHALIS*.

*Sarcogramma atrinuchalis*, nobis, J. A. S. B. xxxi. p. 345, note.

Common from Arakan to Malacca. It has much more black on the nape than the Indian race, margined with white below, more or less developed.

[Yey-tho, Thayet Myo, Tonghoo, Karen nee (*W. R.*).]

\* H. Schlegel, Mus. des Pays-Bas, *Cursores*, p. 69.





549. *SARCIOPHORUS BILOBUS* (J. 856).

Thayet-Myo.

[Boddaert's specific title, *malabaricus*, has priority, as a glance at Pl. Enl. 880 will show.]

\*550. *HOPLOPTERUS VENTRALIS* (J. 857).

Common along the banks of rivers. Mr. Swinhoe met with it in Hainan [Tonghoo, Karen nee (*W. R.*).]

\*551. *SQUATAROLA HELVETICA* (J. 844).

Arakan.

[Tonghoo (*W. R.*).]

\*552. *CHARADRIUS FULVUS* (J. 845).

Common in the cold season.

[Thayet Myo, Tonghoo (*W. R.*).]

553. *ÆGIALITES PLACIDA*.

*Ægialites placidus*, G. R. Gray, Cat. Hodga. Coll. 2nd ed. p. 70, 1863; *A. hartingi*, Swinhoe; *Eudromias tenuirostris*, A. O. Hume, probably *Charadrius longipes*, apud David, N. Arch. de Mus. 1867, p. 38.

A specimen of this bird was believed by Dr. Jerdon to have been procured by him in Burma, but he was not sure whether he obtained it on the coast or inland.

\*554. *Æ. MONGOLICA* (J. 847).

Common in the cold season.

\*555. *Æ. DUBIA* (J. 849).

*Charadrius dubius*, Scopoli, Del. Fl. Faun. Insubr. ii. p. 92.

Smaller than the European *Æ. curonicus*, but otherwise similar, and of common occurrence.\*

[*Æ. philippensis*, apud Jerd., No. 849, and which is the number in Mr. Blyth's MS., is = *C. curonicus*, Gm. But perhaps the species actually intended by Mr. Blyth is *Æ. minuta* (Pallas), apud Jerdon, No. 850, and of which Lieutenant W. Ramsay obtained specimens at Tonghoo. The title *C. philippensis*, Lath., was founded on the same plate as that of *C. dubius*, Scopoli. Until the species which inhabits the island of Luzon has been studied, the correct titles for the two species cannot be determined. The synonymy is very simple, but the correct application of the various titles cannot be made until the Philippine type has been compared.]

\* For notice of *Æ. philippensis*, commonly referred to the same, vide Ibis for 1867, p. 164.





[556. *Æ. CURONICUS* (J. 849).  
Rangoon (*W. R.*).]

\*557. *Æ. ALEXANDRINUS* (J. 848).  
*C. alexandrinus*, Lin.  
Arakan.  
[Tonghoo (*W. R.*).]

*Fam. Hæmatopodidæ.*

\*558. *STREPSILAS INTERPRES* (J. 860).  
Arakan.

559. *HÆMATOPUS OSTRALEGUS* (J. 862).  
Arakan; China and Japan (*H. Schlegel*).

*Fam. Glareolidæ*

Pratincoles.

\*560. *GLAREOLA ORIENTALIS* (J. 842).  
Arakan, Pegu.  
[Tonghoo (*W. R.*).]

\*561. *G. LACTEA* (J. 843).  
Arakan, Pegu, Tenasserim. Dr. Jerdon found this species breeding at  
Thayet Myo, with the young just flown in May.  
[Tonghoo (*W. R.*).]

*Fam. Recurvirostridæ.*

\*562. *HIMANTOPUS AUTUMNALIS* (J. 898).  
Arakan. *H. leucocephalus*\* will doubtless be met with.†  
The Stilt-plovers of the Old World have bright rose-coloured legs, and  
ruby-red irides; while those of America (*H. nigricollis*) have very much paler  
pinkish legs and dark irides; diversities which are not seen in the dry skins.  
[Karen hills (*W. R.*).]

\* Gould, *Birds of Australia*, vol. vi. pl. 24.

† *cf.* *Ibis*, 1865, p. 35, 1867, p. 169; *J. A. S. B.* xli. pt. 2, p. 253.



*Fam. Scolopacidæ.*

*Snipes, etc.*

\*563. *TOTANUS GLOTTIS* (J. 894).

Arakan.

[Upper Pegu (O.).]

\*564. *T. STAGNATILIS* (J. 895).

Arakan, Tenasserim.

[Upper Pegu (O.).]

\*565. *T. CALIDRIS* (J. 897).

Arakan.

[Karen nee (W. R.).]

\*566. *ACTITIS GLAREOLA* (J. 891).

Arakan.

[Tonghoo, Karen nee (W. R.).]

\*567. *A. OCHROPUS* (J. 892).

Arakan.

[Upper Pegu (O.).]

\*568. *A. HYPOLEUCUS* (J. 893).

Arakan, Tenasserim.

[Tonghoo (W. R.).]

\*569. *XENUS CINEREUS* (J. 876).

Arakan, Tenasserim.\*

\*570. *LIMOSA JEGOCEPHALA* (J. 875).

Arakan.

\*571. *NUMENIUS LINEATUS* (J. 877).

*Numenius lineatus*, Cuvier, R. An. 2nd ed. i. p. 521; Lesson, Tr. d'Orn. p. 665; *N. major*, Fauna Japonica, Aves, pl. 66.

Arakan.

[Kyasoo creek (W. R.). Mr. Blyth has always maintained that the Indian differed from the European Curlew.]

\*572. *N. PHÆOPUS* (J. 878).

Arakan, Tenasserim, Andamans, and Nicobars.

[Thayet Myo (F.).]

\* *cf.* Ibis, 1873, p. 68.





\*573. *TRINGA SUBARQUATA* (J. 882).

Arakan, Tenasserim.

\*574. *T. PLATYRHYNCHA* (J. 886).

*T. platyrhyncha*, Tem.; Gray and Mitchell, Gen. Birds, pl. 157, fig. 2.

Arakan.

\*575. *T. SALINA* (J. 884).

*T. salina*, Pallas; *T. damacensis*, Horsfield; *T. subminuta*, Middendorff.

Arakan, Tenasserim.

[Rangoon, Tonghoo (*W. R.*). While *T. damacensis*, Horsf., remains unidentified, it will be best to adopt Middendorff's title of *subminuta* for this species. Mr. Swinhoe identifies *T. salina*, Pallas, with *T. albescens*, Tem., a species which has a red neck and throat in spring. For it, *T. ruficollis* is the oldest title.]

\*576. *T. TEMMINCKII* (J. 885).

Arakan.

[Tonghoo (*W. R.*).]

577. *EURYNORHYNCHUS PYGMEUS* (J. 887).

*E. pygmaea* (Lin.), Gray and Mitchell, Gen. Birds, pl. 157, fig. 1; Gould, B. As. pt. xxi. pl. 13; Ibis, 1869, pl. xii.

Estuaries of rivers, on extensive mud-banks left by the tide.

\*578. *PHILOMACHUS PUGNAX* (J. 880).

Arakan.

[Moerhing's generic title cannot be used, and as Leach gave no generic characters, and was not substituting a title, *Pavoncella* must fall, and *Machetes*, Cuv., be adopted.]

579. *GALLINAGO SCOLOPACINA* (J. 871).

Common in Upper Burma.

[Tonghoo (*W. R.*); Pabyouk (*D.*).]

\*580. *G. STENURA* (J. 870).

The most common snipe of the Indo-Chinese and Malayan countries.

[*Scolopax stenura*, Kuhl, MS.; *S. sthenura*, Bp., An. St. Nat. 1829; *S. horsfieldii*, J. E. Gray, Zool. Misc. 1831, p. 2. Mr. G. R. Gray (H. L. No. 10344) most unaccountably gives Dr. Gray's title the precedence.]





[581. *G. GALLINULA* (J. 872).  
Upper Pegu (O.).]

[582. *SCOLOPAX RUSTICOLA* (J. 867).

An example of this Woodcock was shot at Moulmein by Colonel D. Brown a few years since (*vide* Hume, Str. Feath. ii. p. 482).]

\*583. *RHYNCHEA BENGALENSIS* (J. 873).

Arakan, Tenasserim.

[Rangoon, Yey-tho (W. R.).]

*Fam. Parridæ.*

*Jacanas.*

\*584. *METOPIDIUS INDICUS* (J. 900).

Arakan, Tenasserim.

[Tonghoo (W. R.).]

\*585. *HYDROPHASIANUS SINENSIS* (J. 901).

Arakan, Tenasserim.

[Tonghoo (W. R.). Must stand *M. chirurgus* (Scop.), unless on comparison the Philippine bird be found to differ.]

*Fam. Gruidæ.*

*Cranes.*

586. *GRUS ANTIGONE* (J. 863).

*Kyo-gya.*

Arakan and Pegu. Very numerous in the interior in large flocks. According to Lieut. Beavan, it breeds in Burma.\* Cantor procured it in Province Wellesley, and it is common in Siam.

587. *G. LONGIROSTRIS* (J. 865).

*G. longirostris*, Tem., Fauna Japonica, Aves, pl. lxxii. ; *G. cinerea*, of Indian authors ; cf. Ibis, 1873, p. 81.

Included by Mason, and was observed by Mr. Swinhoe in Hainan.

\* P. Z. S. 1867, p. 762.



*Fam. Ibisidæ.*

## Ibises.

\*588. *FALCINELLUS IGNEUS* (J. 943).

Arakan.

\*589. *GERONTICUS PAPILLOSUS* (J. 942).

Arakan.

\*590. *IBIS MELANOCEPHALUS* (J. 941).

*Kula-gowk.*

Arakan, Tenasserim, Siam.

*Fam. Ciconiidæ.*

## Storks.

\*591. *TANTALUS LEUCOCEPHALUS* (J. 938).

Arakan, Tenasserim. Common.

[Tonghoo (*W. R. in epist.*).]

\*592. *ANASTOMUS OSCITANS* (J. 940).

*Kha-ru-tsoke.*

Arakan.

\*593. *XENORHYNCHUS AUSTRALIS* (J. 917).

Arakan, Tenasserim.

[The Asiatic Jabiru, even if it be identical with the Australian, must take the title of *asiatica*, Lath.]

\*594. *CICONIA EPISCOPUS* (J. 920).

*Ciconia microscelis*, Gray and Mitchell, Gen. Birds, pl. 151. *Khyet-kheng-tswop.*

Arakan, Tenasserim, Malayan countries.

[Upper Pegu (*O.*).]

595. *C. ALBA* (J. 919).

Included by Mason.

596. *LEPTOPTILUS ARGALA* (J. 915).

Arakan, Tenasserim. Breeds on trees on the limestone mountains.

[Tonghoo (*W. R. in epist.*). Although long ago shown by Professor Schlegel (Mus. P.-Bas, *Ardeæ*) that, under the title of *Ardea dubia*, Gmelin





had confounded three distinct species, namely the two Indian and the African, Mr. G. R. Gray (H. L. No. 10195) adopted Gmelin's title for the larger Adjutant of India. It is even doubtful whether Latham's title of *argala* may in strictness be employed. If it be rejected, an unexceptionable title, Professor Alfred Newton suggests, is available in *A. gigantea*, R. Forster (1795, Faun. Ind. p. 11), and the adoption of which would avoid the necessity of using Temminck's most objectionable title of *marabu*.]

\*597. *L. JAVANICA* (J. 916).

*Dung-tsat* and *Nghet-gyee*.

Arakan, Tenasserim, Hainan.

*Fam. Ardeidæ.*

*Hérons.*

\*598. *ARDEA SUMATRANA* (J. 922).

*Ardea sumatrana*, Raffles; Gould, B. Austr. vol. vi. pl. 54.

Arakan, Tenasserim, Malacca, Sumatra, and Australia.

\*599. *A. CINEREA* (J. 923).

Generally diffused.

\*600. *A. PURPUREA* (J. 924).

*Khyung byaing*.

Generally diffused.

\*601. *HERODIAS ALBA* (J. 925).

Arakan.

[*Cf.* Swinhoe, P. Z. S. 1871, p. 412, *E. modesta*.]

\*602. *H. INTERMEDIA* (J. 926).

*Ardea intermedia*, Wagler; Fauna Japonica, Aves, pl. 69; Gould, B. Austr. vol. vi. pl. 57.

Frequents open places about the town of Rangoon. Obtained at Bhamo.

\*603. *H. GARZETTA* (J. 927).

Common in the interior.

604. *H. EULOPHOTES*.

*H. eulophotes*, Swinhoe, Ibis, 1860, p. 44; Gould, B. Austr. vol. vi. pl. —.

Obtained by Major Berdmore at Mergui.



605. *H. CONCOLOR.**Demicregretta concolor*, nobis, J. A. S. B. xv. p. 372.

Arakan (Ramri), Andaman and Nicobar Islands.\*

\*606. *BUPHUS COROMANDUS* (J. 929).

Arakan.

\*607. *ARDEOLA GRAYI* (J. 930).

Arakan.

[Karen nee (*W. R.*).][608. *A. PRASINOSCELES.**A. prasinoscetes*, Swinhoe, Ibis, 1860. p. 64.

Examples obtained by Mr. Davison at Tavoy and Ye-boo, are thus identified by Mr. Hume (Str. Feath, ii. p. 483).]

\*609. *BUTORIDES JAVANICUS* (J. 931).

Common.

[Tonghoo, Rangoon (*W. R.*).]\*610. *ARDETTA FLAVICOLLIS* (J. 932).

Common.

[Tonghoo, Rangoon (*W. R.*).]\*611. *A. CINNAMOMEA* (J. 933).

Common.

[Rangoon, Tonghoo (*W. R.*).]\*612. *A. SINENSIS* (J. 934).

Common.

[Tonghoo (*W. R.*).]\*613. *GORSACHIUS MELANOLOPHUS.**Ardea melanolopha*, Raffles, Tr. L. S. xiii. p. 326.

Specimen obtained in Ramri by Major J. R. Abbott.

\* *Ardea jugularis*, Forster, is given by Herr v. Pelzeln from the Nicobars, in addition to *A. concolor*.

[The specific title of *sacra*, Gm., supersedes that of *concolor*, Blyth (*cf.* Walden, Ibis, 1873, p. 318). *A. jugularis*, Forster, is synonymous.]





\*614. *NYCTICORAX GRISEUS* (J. 937).

Arakan, Bhamö.

[Rangoon (*W. R.*).]

*Fam. Rallidæ.*

*Rails, Coots, etc.*

\*615. *PORPHYRIO POLIOCEPHALUS* (J. 902).

Arakan, Tenasserim. *P. smaragdinotis* is given from Siam.\*

[Tonghoo (*W. R.*). Latham's description agrees well with the common Indian purple Coot. He says nothing about a brown back, and that the whole head, neck, and lower parts are unicolorous pale lavender-blue, as stated by Mr. Hume (*Str. Feath.* iii. p. 185). Latham describes the bird as having the back purple; the head and neck, blue-grey, growing to azure towards the chin; breast and belly verditer green (*Suppl.* ii. p. 375).]

\*616. *GALLICREX CRISTATUS* (J. 904).

Arakan, Tenasserim.

[Upper Pegu (*O.*). Must stand *G. cinereus* (Gm.).]

\*617. *PORZANA PHENICURA* (J. 907).

*Rallus phœnicurus*, Forster; Gould, B. As. pt. xxiv. pl. 12.

Arakan, Tenasserim, Siam. Common.

[Tonghoo (*W. R.*).]

\*618. *P. MARUETTA* (J. 909).

Arakan.

\*619. *P. PYGMÆA* (J. 910).

Common.

\*620. *P. FUSCA* (J. 911).

Common.

\*621. *HYPOTENIDIA STRIATA* (J. 913).

Common.

[Rangoon (*W. R.*).]

\* Ibis, 1864, p. 246, note.

[*P. smaragdinus*, Tem. P. C. 421 = *P. indicus*, Horsf., and not the African *P. smaragnotus*, Tem. = *Gallinula madagascariensis*, Lath., is the species alluded to.]





[622. *RALLINA CEYLONICA* (J. 912).

Thayet Myo (O.).]

[623. *R. FASCIATA*.

*Rallus fasciatus*, Raffles, Tr. L. S. xiii. p. 328.

Amherst (D.).]

\*624. *RALLUS INDICUS* (J. 914).

*R. japonicus*, Schlegel.

Arakan.

\*625. *GALLINULA CHLOROPUS* (J. 905).

Arakan.

[Upper Pegu (O.).]

\*626. *FULICA ATRA* (J. 903).

Arakan.

\*627. *PODICA PERSONATA*.

*Podica personata*, G. R. Gray, P. Z. S. 1848, 90, *Aves*, pl. 4; Gen. Birds, pl. 173.

Cachar, Tenasserim provinces, Malacca.

"These very rare birds in Tenasserim," remarks Col. Tickell, "are met with in shady deep narrow streams in forests, whether in the tideway or remotely inland. They swim rapidly, but seldom dive; and although eminently aquatic in conformation, resort, strange to say, for safety to land. Scrambling up the steep banks when shot at, and running with unexpected rapidity into dense thickets, its flight is like that of the Coot, or Water-hen, squattering along the surface of the water." \*

#### Fam. Laridæ.

##### Gulls.

628. *LARUS ICTHYAËTUS* (J. 979).

Ramri.

\*629. *XEMA BRUNNEICEPHALA* (J. 980).

*Chroicocephalus tibetanus*, Gould. Mason also includes *X. ridibunda*.

Arakan.

\* Tickell, J. A. S. B. xxviii. p. 455.



630. *LESTRIS POMATORHINUS*.

An example in mature plumage procured by Colonel Tickell near Moulmein.\*

*Fam. Sternidæ.*

## Terns.

\*631. *GEOCHELIDON ANGLICA* (J. 983).

Arakan.

\*632. *HYDROCHELIDON INDICA* (J. 984).

Arakan, Tenasserim.

633. *THALASSEUS CRISTATUS* (J. 989).

*Sterna bergii*, Licht.; *S. velox*, Ruppell.

Tenasserim coast.

634. *TH. MEDIUS* (J. 990).

*Sterna media*, Horsfield; *S. affinis*, Ruppell; *S. bengalensis*, Lesson; *S. torresii*, Gould.

Arakan, Tenasserim.

\*635. *SEENA AURANTIA* (J. 985).

A common river Tern.

[Tonghoo, Sittang river (*W. R.*).]

\*636. *STERNA MELANOCASTRA* (J. 987).

*Sterna melanogaster*, Tem.; Gould, B. As. pt. x. pl. 16.

A common river Tern.

Of maritime Terns which must needs occur on the coast may be mentioned *Onychoprion melanauchen* (Tem.), P.C. 427, which breeds plentifully in the Nicobars; *O. panaya*, *Anous stolidus*, and *A. tenuirostris*.†

On the coast must also necessarily occur *Phaeton athereus*, *Sula fiber*, and probably *Fregata*.

[Tonghoo (*W. R.*). Horsfield's title, *javanica*, has priority.]

[637. *S. MINUTA* (J. 988).

Tonghoo (*W. R.*).]

[638. *S. ———* ?

Irrawady river (*W. R.*). I have not as yet been able to identify this species.]

\* J. A. S. B. xxviii. p. 416.

† *cf. Ibis*, 1867, p. 178.





639. *RHYNCHOPS ALBICOLLIS* (J. 995).

Not rare. Frequently seen on the Tavoy river, according to Mason.  
[Tonghoo (*W. R.*).]

### Order NATATORES.

#### Tribe TOTIPALMATÆ.

#### *Fam. Pelecanidæ.*

##### Pelicans.

640. *PELECANUS JAVANICUS*.

Common.

[Jerdon's number is left blank in MS.]

\*641 *P. PHILIPPINENSIS*.

*P. philippinensis*, Gm.; Ann. M. N. H. xiv. p. 122; J. A. S. B. xviii. p. 821.

Common.

[Jerdon's number is left blank in MS.]

#### *Fam. Graculidæ.*

##### Cormorants.

642. *GRACULUS CARBO* (J. 1005).

Obtained by Colonel Briggs at Tavoy,\* and common in Upper Burma.

Finlayson probably means this Cormorant when he mentions having procured "a fine species of black Pelican" in the Gulf of Siam.

[Tonghoo (*W. R.*).]

643. *G. FUSCICOLLIS* (J. 1006).

*Phalacrocorax sulcirostris*, Brandt.

Bhamo, Mouloung lake (*J. Anderson*).

644. *G. PYGMÆUS* (J. 1007).

*Ten-gyie*.

Common.

[Tonghoo, Sittang river (*W. R.*).]

\* P. Z. S. 1869, p. 150.



Fam. Plotidæ.

Darters.

\*645. *PLOTUS MELANOGASTER* (J. 1008).

*Ten-gyie.*

Arakan, Tenasserim. Enormous flocks near Mengoon (*J. Anderson*).  
The alleged Australian species (*P. novæhollandiæ*, Gould) differs in no respect.  
[Tonghoo (*W. R.*).]

Tribe LAMELLIROSTRES.

Fam. Anatidæ.

\*646. *SARCIDIORNIS MELANONOTUS* (J. 950).

*Tau-won-bai.*

Common.

[Tonghoo (*W. R.*).]

\*647. *DENDROCYGNA ARCUATA* (J. 952).

Common. *D. major* is also included by Mason.

[Tonghoo (*W. R.*).]

\*648. *CASARCA RUTILA* (J. 954).

Arakan, Bhamo.

649. *C. LEUCOPTERA* (J. 955).

Inhabits the valleys of the great rivers, from the Megna at least to the Tenasserim. The *Anas scutulata*, S. Müller, seems to be a domesticated, if not hybrid, variety of this species, and the examples of it in the British and Leyden Museums have much intermixture of white in the plumage.

\*650. *NETTOPUS COROMANDELIANUS* (J. 951).

*Karagat.*

Common.

[Tonghoo (*W. R.*).]

\*651. *ANAS PÆCILORHYNCHA* (J. 959).

Arakan, Bhamo, Tenasserim.

\*652. *A. CARYOPHYLLACEA* (J. 960).

*A. caryophyllacea*, Latham; Gray and Mitchell, Gen. Birds, pl. 168.

Arakan, Bhamo.





\*653. *A. STREPERA* (J. 961).

Arakan.

\*654. *A. ACUTA* (J. 962).

Arakan.

\*655. *A. CIRCIA* (J. 965).

Arakan, Tenasserim. Has been known to breed near Moulmein.

[Tonghoo (*W. R.*).]

\*656. *A. CRECCA* (J. 964).

Arakan, common at Bhamo, Hainan.

\*657. *A. PENELOPE* (J. 963).

Arakan, Hainan.\*

\*658. *FULIGULA NYROCA* (J. 969).

Arakan.

659. *BRANTA RUFINA* (J. 967).

Bhamo.

[If employed, *Branta* should be written *Brenthus*. But as the type of Scopoli's genus (*Ann. I. Hist. Nat. p. 67*) is *A. bernicla*, Lin., *A. rufina* cannot well be included under it.]

Tribe — (?)

*Fam. Podicipidæ.*

Grebes.

\*660. *PODICEPS PHILIPPENSIS* (J. 975).

Arakan.

[Tonghoo (*W. R.*).]

\* *A. punctata* (*Anas punctata*, Cuv., Gould, B. Austr. vii. pl. 11; *Querquedula andamanensis*? Tytler) inhabits the Andaman Islands (Ball, J. A. S. B. xli. pt. ii. p. 290). [Not *A. punctata*, Cuv., but *M. gibberifrons*, S. Müller = *M. albogularis*, Hume.]



[From the total number of birds known to inhabit Burma, 660, as noted in the foregoing list, four must be deducted. Namely :

1. *Palæornis melanorhynchus*, apud Blyth.
2. *Teraspizias rhodogastra*.
3. *Micropternus burmannicus*=*M. rufinotus*.
4. *Pellorneum minor*=*P. tickelli*.

The next seven species may have been confounded with species also enumerated :

5. *Caprimulgus indicus* with *C. jotaka*.
6. *Cypselus batassiensis* with *C. infumatus*.
7. *Sturnia malabarica* with *S. nemoricola*.
8. *Brachyurus megarhynchus* with *B. moluccensis*.
9. *Cryptolopha burkii* with *C. tephrocephalus*.
10. *Orthotomus edela* with *O. flavi-viridis*.
11. *Macropygia ruficeps* with *M. assimilis*.

And the total may have to be still further reduced by three more species, namely :

12. *Sturnia sinensis*, its occurrence not resting on good evidence.
13. *Machlolophus subviridis*, apparently *M. spilonotus*, juv.
14. *Brachypodius cinereiventris*, perhaps a variety only of *B. melanocephalus*.

The following four species, not separately enumerated, may have to be added :

1. *Megalæma virens*, in addition to *M. marshallorum*.
2. *Hemixus hildebrandi*, in addition to *H. flavala*.
3. *Criniger griseiceps*, in addition to *C. flaveolus*.
4. *Osmotreron vernans*.

Further investigations will doubtless make known a great many more forms belonging to either Himalayan or Malayan genera.]—WALDEN.